RAILROAD GAZETTE

FRIDAY, DECEMBER 14, 1894.

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Contributions.

Rating Freight Train Loads.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reference to rating freight train loads: I have found that a safe rule is to assume that an engine will haul just twice as many miscellaneous cars as of maximum loaded cars, such as lading of coal, ore, etc. The real standard of the work that can be done by an engine should, I think, be based upon cars with maximum loads. I have found that where an engine could haul 50 loaded coal cars the same engine could haul 100 loaded box and gondola cars. These are *concrete* facts from actual and continued experience.

HEADLIGHT.

More About Those Freight Car Specifications.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I write to express my personal obligation to you for the short article published in your last issue concerning the specifications for 750 box cars for one of the receivership railroads. It must have taken some sand for you to publish such a paragraph. Having begun it, I wish you would keep on. Give us the main points of other specifications which may be hereafter submitted for bidding. I will furnish you such as soon as we can afford to give out an order, which I hope will be soon.

In fact the piece was in the interest of the railroads, the contracting car builders and the supply men, because open and honest competition is best for all. It gives the railroads a chance to get the lowest market prices and the best materials. It gives the car builders a chance to earn money by skill and care and good service; and it gives the supply men, too, the same chance.

I have not a word to say against the morality of specifying so closely as the company in question did. If a railroad company wants to buy a certain man's product and does not want to buy another's, it has a perfect right to say so. The whole thing is, as you said, a matter of business policy, and I do not believe that it is good business policy to specify so closely as was done in this case.

M C. B.

Old Rail Bridges.

Kingan & Co.,
INDIANAPOLIS, IND., December 4, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice Mr. J. B. Greiner, Engineer of Bridges, Baltimore & Ohio Railroad, has built a bridge out of old railroad iron and gives out that it is the "first bridge ever built of the kind." I do not suppose he means in the material of which it is composed, but in the construction. I presume he has not informed himself that the approaches (two spans) to the Ferro Carrill de San Jose y Soledad of Cuba have the same kind of construction as his cuts show in the *Railroad Gazette* of Nov. 30, 1894.

There is a bridge 400 ft. long on railroad iron bents, over the Rio Purial in Cuba, river span 76 ft. 9 in. long; top chords of two rails; bottom of single rail, except the span over the water; that has two rails in bottom chord. This bridge was constructed at the shops in Guantañamo and hauled out in sections on cars and placed in position over false work, upon the foundations, and the whole constructed from 18-ft. rails weighing 56 lbs. per yard. Railroad trains pass daily over it 34 ft. above low water mark; for seven years trains have been passing to and fro over this structure. I presume it is the first if not the only bridge of this kind and length in the world.

The New York, Susquehanna & Western has one between Paterson and Wortendyke and one at Two Bridges that has been in use since 1878, I believe, trains every day passing over them, but the bridges are of short length.

In Nova Scotia, I believe, a bridge is in use over a stream for highway purposes of something near 100 ft. or so, but I forget the locality.

WALTER S. PHELPS. *Chief Engineer.*

[We never had any suspicion that Mr. Greiner claimed originality for anything more than the details of the design of his old rail bridge; of course he knew that this sort of material had often been used before. Perhaps the extent of his claim might have been more precisely expressed, but it did not occur to us until now that anyone would misunderstand it. For the Guantañamo bridge see *Railroad Gazette*, 1892, page 961.—EDITOR RAILROAD GAZETTE.]

The Library of the American Society of Civil Engineers.

American Society of Civil Engineers,
NEW YORK, December 7, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A communication from Mr. G. Leverich in your issue of Nov. 30, 1894, entitled "A War Time Bridge," is liable to misconstruction. He states that there is in the Library of the American Society of Civil Engineers "a mass of material, relating to early engineering in this country in the shape of reports and illustrations, which cannot be found elsewhere or reproduced, and which, from the lack of a handy catalogue, is largely unknown and nearly inaccessible to engineers."

During the last three years the Library of the American Society of Civil Engineers has been entirely rearranged, and the card catalogue carefully verified and cross-referenced, so that as a reference library it is amply provided with facilities for finding anything therein contained. A list of duplicates containing about 2,000 titles, many of them reports of considerable value, has been compiled and classified and is about to be sent to members, libraries, etc., with a view to sale or exchange for the benefit of the Library. Other changes now being carried out will make room for a better arrangement of the maps and photographs than has heretofore been possible.

Nevertheless had Mr. Leverich inquired about the photographs of the "Murphy Military Bridge over the Gauley River" he would have found that Nos. 606 and 610 in Drawer 14, are those which he presented to the Society about 20 years ago. As the library of the Society is purely a reference library, the very considerable expense which the publication of a catalogue would incur would hardly be justified; especially since the rapid growth of this library would soon make such catalogue obsolete.

F. COLLINGWOOD, *Secretary Am. Soc. C. E.*

The Badge of the American Society of Civil Engineers.

BOSTON, Dec. 7, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you kindly inform me as to the effect of the new regulations of the American Society of Civil Engineers in relation to procuring badges? It seems that a prior requisite to the procuring of a badge, is a definite written contract, part of which is as follows: "I furthermore waive my right, under the Constitution, of resignation from membership until the said badge shall have been returned."

What will be the status of a member whose new badge has been either lost or stolen? Has not such a member pledged himself to perpetual membership in the Society? Is there any good reason why his liability for the payment of dues should cease even by the accident of death, if his badge is not returned?

Is not the Board of Direction negligent of duty in not requiring him to bind his heirs and assigns for the payment of perpetual dues until the recreant badge shall be returned? Isn't there more danger of improper use of the badge by some distant relative and heir than at the hands of one who has once been elected to membership?

Again, in the case of impending expulsion, what would be the effect if a member should present as his defense that he was anxious to resign but couldn't; he had lost his badge?

But is there not after all a loophole, one means of escape from the Society for a member who has lost his badge? He has not pledged himself irrevocably not to neglect the payment of dues; and by continuing in arrears one year he loses his membership. Cannot a conscientious man, having thus succeeded in withdrawing, then present to the Society a sum equal to one year's dues, and go on his way rejoicing, badge or no badge?

As to the necessity for a new badge, the writer is not one who saw any impropriety in the old one. Is it easy to think of any engineering work in which the level is not well nigh essential? If the transit be the instrument of the surveyor, is not the level especially the instrument of the engineer?

As to the argument that "the letters A. S. C. E. with the date 1852 are susceptible of a varied interpretation by those not in the secret," we, of course, have all heard of the Nantucket skipper who bewailed the ignorance of the New York yachtsman whose craft bore the name "Psyche"; a strange way to spell "Fish," thought the skipper. But is there any one who will be disposed to charge any member of the "A. S. C. E." with being a "donkey," unless indeed he gives cause for it, perhaps in some such way as by signing an iron-clad contract in order to pay $6 for a badge which he solemnly agrees to be worth only $1.25?

The first or any obsolete edition of a valuable book has nowadays a fancy value. Isn't it likely that the old badge, now unprocurable, will soon have a special, perhaps a fictitious value? Will it not serve in some degree to distinguish the older members from those lately admitted? Isn't the old badge good enough?

C. FRANK ALLEN.

P. S. It appears that in the preliminary contract "receipt is hereby acknowledged." Doesn't a member seeking for a new badge pledge himself to everlasting membership in case he should never receive his badge? Is there any reason, then, why a prudent man should not buy an annuity or become a life member before applying for a badge, even though the expense be large for a badge worth $1.25?

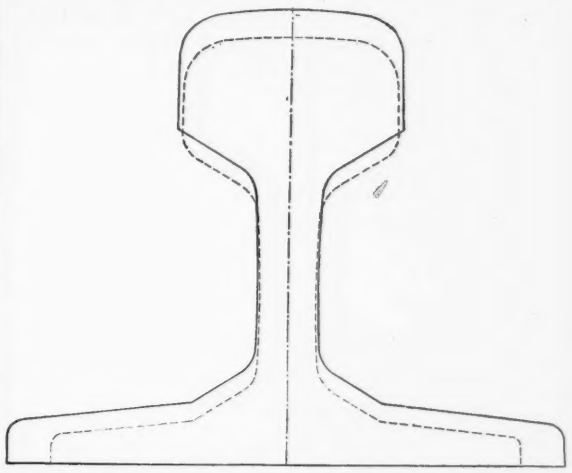
Heavier Rails.

LONDON, Nov. 28, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read the letters of your correspondents "Headlight" and "Engineer," and being the first designer of a 100-lb. rail, in 1886, I am naturally interested in the subject. The principle of heavier rails which I have advocated ever since then has met with general approval in all countries, and this, the first opposition, comes rather late in the day.

The Belgian State followed mine with a 105-lb. section and slightly different design. All over Europe and in America the weight of rail has grown substantially notwithstanding that the question of balancing the engine has been going on at the same time. I enclose two sections showing increase of weight of rail from 87½ lbs. to 110 lbs. This I designed to meet a special case for a



Firm line—110 lbs. per yard; increased section calculated to last 15 years.

Dotted line—87½ lbs. per yard; original section, last 10 years.

Rail Sections for Penge Tunnel, London, Chatham & Dover Railway—C. P. Sandberg's Section.

low and damp tunnel, and where I was bound to use the old fishplates, and allowed no base plates.

The balancing of engine which is resorted to by your correspondents is done almost everywhere in Europe (see an article in *Engineering* last week), but it is not enough to meet the increased demand for speed and ensure safety. The increase of rail weight is steadily going on as the best means of securing an economical and safe road.

In the United States, owing to the import duty, steel has not fallen so low in price as in Europe, while wood, being cheap, has been taken more advantage of by placing the ties closer together, but probably in course of time steel will become cheaper in America and wood dearer and then the principle of adopting heavier rails will be found a necessity even there.

Meanwhile the use of tie plates to strengthen the weak rails and save the ties is resorted to. It would perhaps be well for both "Headlight" and "Engineer" to assist at the Railway Congress here in June next, before they try "to enlighten the railroad people and stop the useless expense of heavier rails."

C. P. SANDBERG.

The Blackwell's Island Bridge, New York.

Of the various bridge projects calculated to bring Manhattan Island into better communication with its neighborhood, the East River Bridge of the Long Island Railroad across Blackwell's Island has been actually commenced. In the *Railroad Gazette* of Dec. 22, 1893, we gave account of some of the principal features of the bridge, but in view of its importance and the fact that actual construction work has been commenced, we repeat some of the facts.

The bridge proper is to be a cantilever structure with straight bottom and curved top chord, on masonry piers—four cantilever and two anchor piers. The two channel spans are 846 ft. each, the two anchor arms are each 200 ft., while the span across the island is 613 ft.

The bridge will carry four railroad tracks designed for very heavy traffic, and there will further be a carriage way and a sidewalk on either side. The channel spans will give a clear headroom of 135 ft. above high water, the same as the Brooklyn Bridge, and the height of the cantilever towers will be 255 ft.

The coffer dams for the two piers on Blackwell's Island have been completed, and the contract for the coffer dam for one of the Long Island piers has been recently let. The railroad company intends to build the piers up to high water by days' labor and has contracted for most of the materials. The granite will come from the Leet's Island, Conn., quarries, and about 40,000 cubic yards of cut granite will be used in the piers. The masonry in the four cantilever piers amounts to 30,000 cubic yards and the two anchor piers contain nearly 8,000 cubic yards.

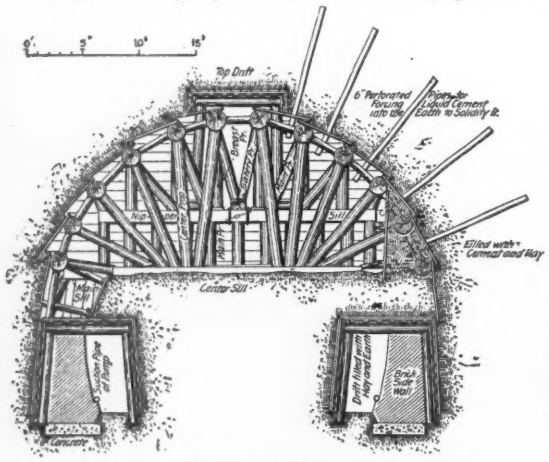
For the superstructure of the bridge, designs and bids have been solicited from various bridge companies, and it is expected the contract will be given out shortly; its weight is estimated at 26,500 tons.

The eastern approach of the bridge in a length of 6,000 ft. will connect with the main line of the Long Island Railroad near Sunnyside, where the road curves to the southwest for its entrance into Long Island City. On the New York side a steel viaduct about 1,600 ft. long will lead to the terminal station, which is to occupy the entire block between 64th and 65th streets and between Second and Third avenues. The terminus will contain 12 tracks at an elevation of 25 ft. above the Second and Third avenues Elevated Railroads, with both of which there is connection. The ground and the first floor of the station are intended for a market, with ample cold storage facilities in the basement, destined to become the distributing point for the market products of Long Island. The total improvement is expected to cost about $8,000,000 and to be finished by the summer of 1897.

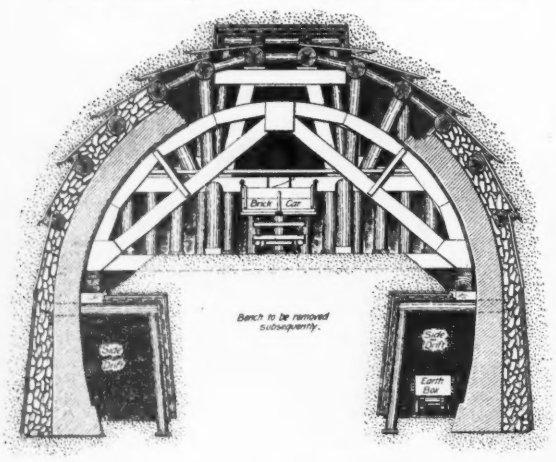
The above information we owe to the courtesy of Mr. Charles M. Jacobs, C. E., M. Inst. C. E., who is the Chief Engineer. Mr. J. V. Davies, M. Am. Soc. C. E., is Principal Assistant Engineer.

The Baltimore Belt Railroad.

The Route—The idea of improving facilities for running trains into the City of Baltimore took firm hold upon the managers of the Baltimore & Ohio Railroad eight years ago. In order to compete successfully with other lines, and to enable trains to run on fast schedule time between Washington and Philadelphia, some means of getting through Baltimore other than by ferry across the Patapsco River was urgently demanded. The first project was to



Section Showing Method of Injecting Cement Grout.



Unfinished Arch, Showing Wooden Centering.

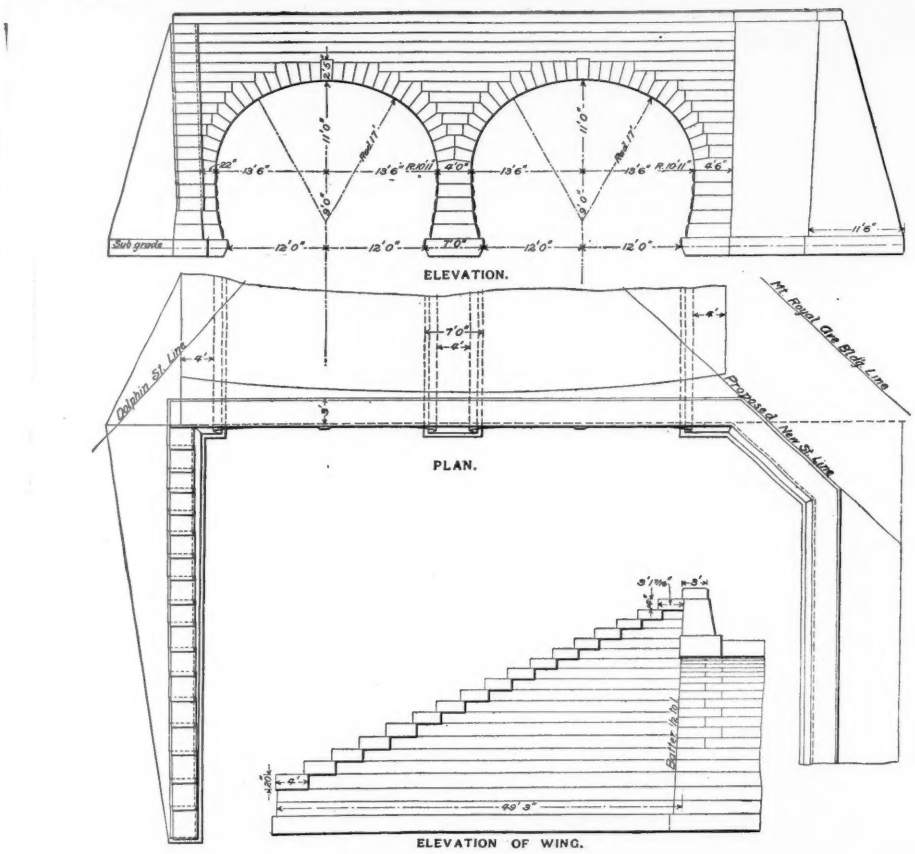
construct an elevated railroad through the lower part of the city, from Camden Station to a point near Bay View; but the expense of acquiring the right of way, and the annoyance of trains passing along an elevated structure at all hours, made the scheme impracticable.

Moreover, about the time this improvement was being considered, it became evident that the growth of Baltimore was setting toward the north. The center of the city, it was seen, would sometime be in the vicinity of Charles street and North avenue. Already large interests were concentrating there, and the notion of locating a depot in that part of the town appealed very strongly to the men casting about for the solution to an important problem. After much consideration, it was decided to run a tunnel under the city, and by means of it to supercede the ferry. Accordingly, $6,000,000 has been expended to save 20 minutes in the schedule time of fast trains, a large force of men has been employed three years in constructing the Belt Line tunnel and the great open cuts of the approaches, and engineering difficulties of enormous magnitude have been met and overcome.

On December 17, 1888, a company was chartered "to construct a railway in the City of Baltimore from Camden Station, of the Baltimore & Ohio Railroad, to a connection with the Philadelphia extension of the Baltimore & Ohio Railroad." The enterprise was planned by officers of the Baltimore & Ohio, and Maryland Central Railroads, (now the Baltimore & Lehigh) the project being intended to afford facilities for the former to reach the heart of the city with its passenger and freight traffic, and for the latter to reach tide-water terminals.

At present, trains over the Baltimore & Ohio Railroad, going east from Baltimore, are ferried across the Patapsco River between Locust Point and Canton, a distance of three-quarters of a mile. They also run four miles through railroad yards and along the public streets of South Baltimore. The distance traversed by the Belt Railroad is about a mile greater than by the present route, but it will save 20 minutes in time. At present also the Maryland Central Railroad enters the city in the Jones Falls ravine, passengers and freight traffic being brought to the company's station on North avenue,—a point at least a mile from any of the boat landings. As a considerable amount of grain and farm produce comes into Baltimore over the Maryland Central Line, this arrangement necessitates a large amount of truckage and expense in transferring freights; and by means of the Belt Railroad this road will be provided with terminal facilities at tide-water, which will greatly benefit its interests.

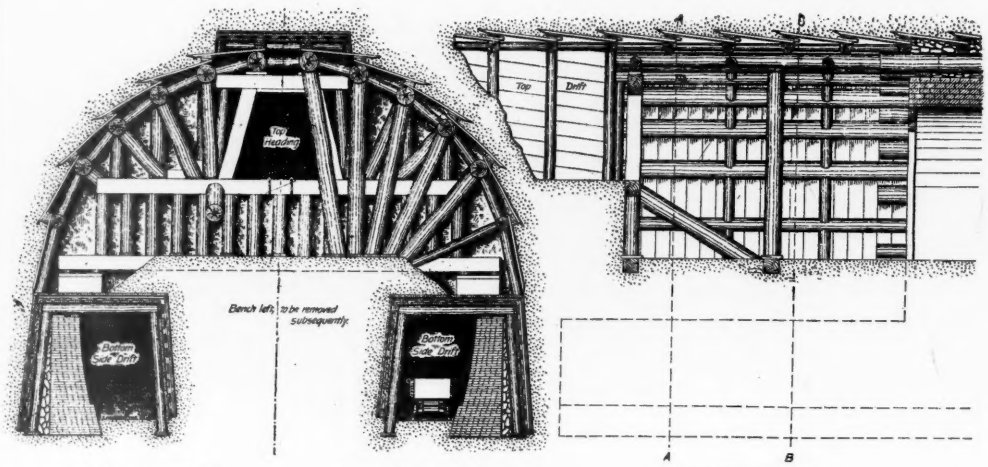
To carry on the work of construction a separate company was organized by the officers of the two railroads interested, in which several Baltimore capitalists are represented, the president of the construction company being John B. McDonald, one of the contractors. September 4, 1890, contracts were awarded to Ryan & McDonald and L. B. McKabe & Brother, of Baltimore, the latter firm taking charge of what is known as "Section Three." The Belt Railroad is seven and three-fourths miles in length, and the cost of its building and equipment is estimated at $6,000,000. The Howard street tunnel is 8,350 feet in length, and its cost is estimated at $1,750,000, the land damages along the line being nearly $1,000,000. Funds were provided for the enterprise by the issue of bonds to the amount of $6,000,000, bearing interest at 5 per cent., and making the fixed charges of the company $300,000 a year. The actual work of construction was begun by Ryan & McDonald, September 1, 1891, and the laying of tracks will be completed about the beginning of next year. It is believed that the Baltimore & Ohio trains will be using the Belt Line before the end of February, but the completion of the enterprise and the erection of the depots will consume perhaps two years.



South Portal, Mt. Royal Tunnels.

The Tunnel.—In no part of its course is the railroad on the surface of streets or avenues. Grade crossings are everywhere avoided, in the eastern portion by embankments and bridges over the city streets, in the central portion by deep cuts and short arches for the roadways above; at North avenue the immense stone bridge, now in process of erection, will be raised over the line of the Belt Railroad, and, diving into the ground at Brevard street, the passageway to Camden Station is entirely underground, beneath the bed of Howard street.

At the Bay View Junction a fill has been constructed wide enough to carry eight tracks. Over the entire route there will be double tracks, and just north of Howard street tunnel a depot is to be constructed and four tracks are provided for, while the cut below Lombard street will also carry several tracks for yard purposes. The tracks rise from the Bay View Junction on a grade of from 0.5 per cent. to 1.5



Half Section on AA. *Half Section on BB.* *Longitudinal Section.*

Section with Timbering in Place.

per cent. to the York Road tunnel, and then descend by different gradients through the length of the line to Camden Station. It was, of course, in that portion of the route, known as "Section Four," that the chief difficulties in construction were found. This section extends from Jones' Falls bridge southward to Camden Station, and is about 11,000 feet in length. The underground passage is 8,350 feet long, and is believed to be the largest soft ground tunnel ever constructed. The tunnel section is 27 feet wide and 22 feet high, and the excavation necessary for laying the arches was from three to five feet larger than this. The tunnel is 70 feet below the surface at the deepest point, the soil through which it was driven being principally sand, with a few seams of gravel, clay and loam. In a few instances veins of hard clay and rotten rock were encountered, which had to be blasted, but for the most part the soil yielded readily to the pick or the steam shovel. All the materials furnished more or less water, and the draining of the shaft during the process of construction was one of the hardest problems to solve. It was done by driving pipes from the surface and pumping by pumps on the street above. The nature of the ground also made necessary the construction of a masonry invert through the entire length of the tunnel to strengthen the side walls and to provide for the safe drainage of the shaft.

The difficulties of construction, however, were not confined to the shaft below, but extended to the character of the ground above. Howard street is one of the busiest thoroughfares in Baltimore, flanked on either side by substantial buildings and carrying a double-tracked street railroad, while several storm sewers and a section of the heavy pipes of the city water system are embedded below. One of the cable roads runs over a portion of Howard street, and in order to avoid blocking the highway and to protect the rights of property holders, resort to numerous expedients became necessary.

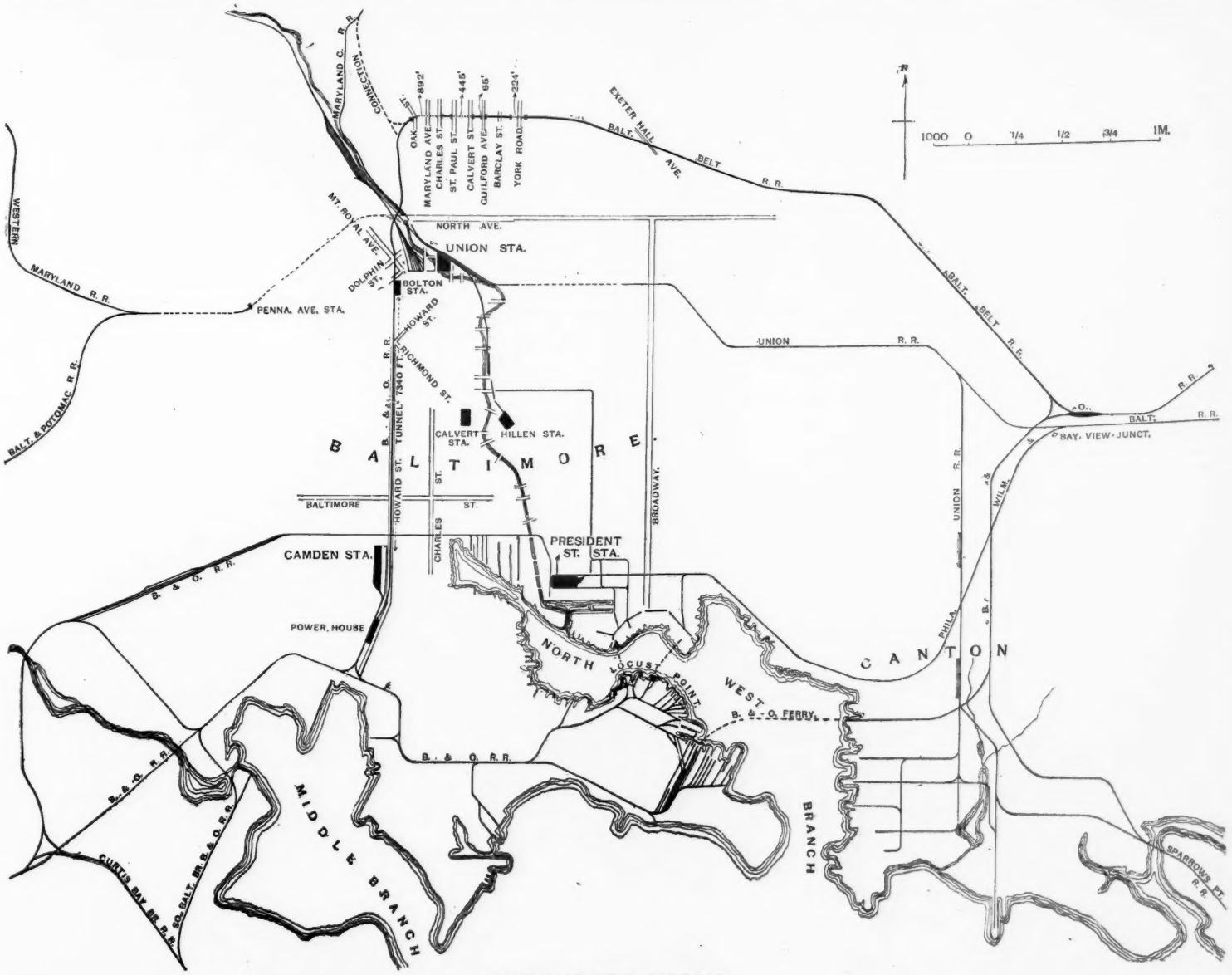
Five shafts were sunk from the surface and the work prosecuted in sections. With two exceptions these shafts were on the side of the street, making the purchase of adjoining property necessary to secure entrance to the tunnel. A vacant lot was secured at the corner of Park avenue and Preston street, and Shaft No. 1 was sunk directly over the tunnel, the ground being easy, the depth slight and abundant room available. The dimensions of this shaft were 30 feet by 10. Two elevator wells were erected here, and a large portion of the work was carried on from this point. Shaft No. 4 was located on the east side of Howard street near Madison, being driven through the cellar floor of a house to a depth of 65 feet. This shaft was 9 by 14 feet inside of the timbers and divided into two compartments, one for lowering the timbers, and the other for the elevator cage. Shaft No. 3 was below Franklin street; this was similar to No. 4 and about the same depth. Shaft No. 2 was the shallowest of all, and was located in Howard street near German. The junction of Liberty street with Howard street at that point left sufficient room for sinking a shaft to the tunnel, but on account of street railroads and other obstacles it was impossible to descend directly over the arch, and a short side drift became necessary.

Work in the tunnel was carried on by the use of plank lagging held in place by heavy timbers. The timbering was a modified form of the English bar system and was found to be practicable for safety and rapid work. The foundations were first laid by running side drifts, the masonry fulfilling the double purpose of supporting the bench and affording solid groundwork for the timbering. Behind the brick work—consisting of five rings of brick above the spring line—rubble was thrown in, and in some cases cement was used, leaving the logs in position, all to serve as defenses to the mason work.

Considerable trouble was experienced in supporting the street above and keeping it in shape for traffic. It was not an uncommon thing during the progress of the work for the street bed to sink four feet in a single night. This had to be immediately repaired and repaved, and the contractors were kept continually busy both above and below. When the high ground in the vicinity of Center street was reached the workmen in the tunnel suddenly opened a pool of water and quick-sand, which almost brought matters to a standstill. An enormous amount of mud gushed into the drift, driving the workmen out and undermining the foundations of the City College on the west side of the street. One of the towers was greatly injured, and it became necessary to blow it down with dynamite. The contractors then turned their attention to the work below, and, by resorting freely to the use of hay, and liquid cement pumped into the soil, the work proceeded after a few days delay.

Great difficulty also was experienced in pushing the arch underneath the York Road in the northern part of the city. A shaft was sunk east of that thoroughfare in a high bank of sand. On the west side of the street stood a large three-story building, whose foundations would have been about 10 feet above the roof of the tunnel. It was proposed to push the shaft through by hydraulic shields. The work was successful for a time, but eventually the arch when partially completed, collapsed on removing the timbers, killing several of the workmen and delaying matters considerably. It was then determined to abandon the plan of forcing the arch further, and the building above was purchased, torn down and the damaged tunnel approached from the west side by means of a cut.

Aside from the underground work, the deep cuts which necessitated the removal of more than 3,000,000 yards of earth, and the massive mason work of the tunnel headings, difficulties of no small proportions had to be met in bridging the Jones Falls ravine, and some of the streets in the northern part of the city. As the line of the road proceeds through the Bolton lot to North avenue it comes out on a level with the grade of that street, after passing over the tunnel of the Baltimore & Potomac Railroad, requiring a portion of the tunnel arch to be removed and a short bridge to be constructed in the roof. The building of the Belt Line Railroad also necessitated considerable changes in the plans of the new North avenue bridge in process of construction by the city. It was raised above grade from the eastern end and elevated sufficiently to carry the roadway over the Belt Line tracks, the expense being shared between the city and the construction company. Below run the tracks of the Northern Central Railroad, the current of Jones' Falls and the tracks of the Maryland Central Railroad, at an angle of 23 degrees with the line of North avenue. The Belt Line passes through under the western approach to this bridge and crosses the ravine a few rods above. But the course changes from northeast to north as it reaches the eastern bluff of the ravine, the curve being entirely on the bridge.



BALTIMORE BELT RAILROAD.

Another peculiar bridge is found a quarter of a mile below the York Road, where Exeter Hall avenue runs through the embankment. Owing to the fact that the avenue crosses the line of the railroad at an acute angle, the bridge has a heavy skew. The avenue is 66 feet wide and the bridge is 200 feet long. Heavy abutments have been constructed on the sides at the street lines, the surmounting bridge being a through girder type. But one girder had to be advanced beyond the other about 60 feet.

Motive Power.—A contract was entered into with the General Electric Company to furnish motors to propel the trains of the Baltimore & Ohio Railroad through the Howard street tunnel. Conductors to furnish power are now being placed in the roof of the tunnel. From the masonry lining is suspended an iron trough, supported by Z-bars, containing the conducting wires. The engine will be propelled by combination trolleys, four poles being used. The locomotive consists of a double set of trucks, each having two axles and four driving wheels. On each axle is mounted a 300-horse-power gearless motor supported on spiral springs resting on the frame of the truck. The motor fields are of the iron-clad type,

each with separate windings imbedded in a mica-lined slot, cut into the curved body of a laminated iron armature.

The axles of the locomotive pass through the hollow shaft on which the armatures are mounted, these shafts resting on the bearings of the motor frame and being connected to the axles by universal couplings, this arrangement of parts allowing freedom of motion in all directions. Each commutator is provided with four sets of brushes, the motors being manipulated by parallel controllers in the cab. The motor can be used for pushing or pulling, and will work in either direction, it being simply a double engine. Each locomotive will have a capacity of 1,200-horse-power, and will weigh nearly 100 tons; it will also be equipped with air brakes, and a whistle worked by a small auxiliary motor within the cab. It is expected that these electric locomotives, of which there will be three in use, will develop a speed of 30 miles an hour, and will propel trains over the Belt Line Railroad between Camden Station and Huntington avenue as quickly as could be done by steam.

If a freight train is to pass through the tunnel the motor will be coupled on behind and will push the train and its locomotive through to Bolton Station, whence the two machines will run the train up grade to Huntington avenue, where the electric motor will be detached without stopping the train. With passenger trains the electric locomotive will couple on ahead, pull the train through to Bolton Station and there leave it, while passengers are getting on and off.

The power-house is in process of erection at the south end of the Belt Line below Camden Station. It will occupy the half square between Henrietta and Montgomery streets, with the side of the building on Howard street. The power-house is a one-story structure, substantially built of red brick. It will be 30 feet high to the eaves, 338 feet long on Howard street, and 69 feet wide. The boiler room is separated from the machinery apartment by a heavy brick firewall. It is 69 by 98 feet and space is provided for a battery of 12 Abendroth and Root boilers, of 30,000-horse-power. In the engine room will be set up four Allis-Corliss compound engines of 750-horse-power each.

The machinery room is 58 by 240 feet in dimensions. The Corliss engines have direct connection with four M. P. S. generators, made by the General Electric Company, each capable of delivering 2,700-horse-power. In addition there will be in the boiler room four Armington Sims engines, each 250-horse-power. Two of these will run 8 M. D. arc machines, each with a capacity of 50 arc lights, and the other two engines will run two A. 100 alternating machines, each with a capacity of 2,000 lights. By means of this enormous light equipment the Howard street tunnel will be made as light as day. The several stations, arches and cuts of the Belt Line will be illuminated at night, ample room being left in the power-house for additional machinery.

The excavations and embankments of the Belt Line Railroad are all completed, a small part of the masonry on the retaining walls of the Bolton Lot cut remaining unfinished. Tracks are laid over the entire course, but not yet ballasted. The electric engineers are at work in the tunnel, and workmen are crowding up the walls of the power-house as rapidly as possible. Finishing touches are being put upon the brdges and masonry, and the greater part of the work will be completed by January 1. Trains can be run over the line soon afterwards, while the depots are building and final repairs to the cuts and embankments are being attended to.

Annual Meeting of the American Society of Mechanical Engineers.

The first part of this convention was reported in our last issue. The fourth session was called to order Wednesday morning and began with the reading of a paper by Prof. C. V. Kerr on "On the Theory of the Moment of Inertia," a written discussion on which was read by the secretary. Prof. Chas. T. Porter then presented four papers on the following subjects: "Comparison of the Action of a Fixed Cut-Off and Throttling Regulation with that of the Automatic Variable Cut-Off, on Compound and Triple-Expansion Engines," "Description of Cam for Actuating the Valves of High Speed Steam Engines," (illustrated by a model of the cam), "Description of an Improved Centrifugal Governor and Valve," and "Description of an Improved Steam Separator and an Improved Steam Jacket." A discussion on these papers was followed by the reading of two papers by Prof. Gaetano Lanza on "Stresses in the Rims and Rim Joints of Pulleys and Fly-wheels," and "The Application of Brakes to the Truck Wheels of a Locomotive."

A paper by Prof. W. F. M. Goss on "An Experimental Study of the Effect of the Counterbalance in Locomotive Drive Wheels upon the Pressure of Contact between Wheel and Rails" was read in abstract by the secretary. Mr. F. N. Forney called attention to the importance of the paper and regretted that the lateness of the hour prevented the members from giving to it the deserved attention. Mr. G. S. Strong related some instances of the destructive effects of imperfect counterbalance on the rail. Several members argued for and against comparing the effects of the counterbalance with a hammer blow, in which Mr. Forney held that such a comparison would be wrong. Mr. George S. Morison spoke of the bending of rails especially at the foot of grades due to the counterbalance. The session then adjourned.

The afternoon was spent by many of the members in visiting interesting points in both this city and Brooklyn. In the evening a reception and conversazione was held at Sherry's. An address by the President was followed by supper and dancing.

Thursday morning's meeting was called to order at 10:30 o'clock. In the absence of President Coxe, Prof. John E. Sweet, senior ex-President, was chosen Chairman. The session opened with a paper by C. J. Field on "Present and Prospective Development of Electric Tramways," an abstract of which appears in another column. In the absence of Mr. M. F. Wood, the Secretary read an abstract of the paper on "Rustless Coatings for Iron and Steel." A paper on "The Effect of Clearance on Economy of a Small Steam Engine," by Geo. W. Bissell, read in abstract by the Secretary, was followed by a paper by D. S. Jacobus on the "Results of Experiments to Test the Accuracy of Small Throttling Calorimeters," after which an adjournment was taken for luncheon.

A special afternoon session was held at 2 o'clock for the purpose of discussing Mr. W. J. Keep's paper on "Relative Tests of Cast Iron," which was read at the first session of the convention. The title given to the discussion was "The Practical vs. the Theoretical Man." The meeting was a very interesting and lively one, and full of humor. Mr. Robert Cartwright, who is a practical foundry man of 45 years' experience, proved the inability of the theoretical man to superintend a foundry. Several members, including Mr. John Fritz, related some of their experiences in foundry work. Mr. Thos. D. West, one of the prominent "theoreticals" present, in giving some analysis of the different grades of iron, said that he thought that too much attention is paid to silicon in chemical analysis of metal, and that more attention should be paid to sulphur. Mr. Keep, in his paper, claims that the best form of test bar is a one-half inch square bar. Several of the members said that a square bar is not practicable; that a round bar should be used, and one that would be the least effected in casting by the temperature of the sand. The question of shrinkage was discussed at length. The session adjourned at 5 o'clock. There was no meeting in the evening.

The closing session was called to order at 10:30 o'clock Friday morning, with the incoming President, E. T. C. Davis in the chair. The following papers were read and briefly discussed: "Experiments on a System of Governing by Compression," by John H. Barr; "Straightening a Leaning Chimney 100 Feet High," by Jos. C. Platt; "Drawing Office Appliances," by A. W. Robinson; "Strength of Railway Car Axles," by L. S. Randolph, and "A Graphical Method of Designing Springs," by George R. Henderson. The secretary then read a paper, in abstract, on "Rail Pressures of Locomotive Driving Wheels," by David L. Barnes.

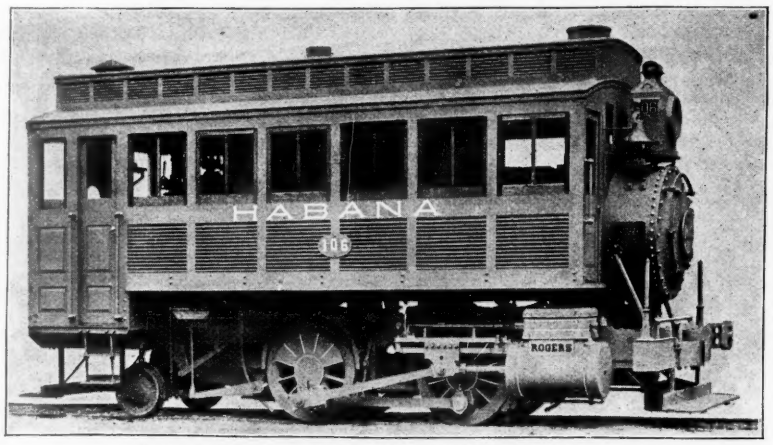
Mr. George S. Morison objected to one of Mr. Barnes' conclusions, which implies that it is impossible to correct the counterbalancing evil. He believes that an engine can be built that will be perfectly balanced, and refers to an engine now being constructed by Mr. Strong, which he thinks will solve the question. Mr. Morison says "balance the revolving parts by revolving parts and the reciprocating parts by reciprocating parts."

At the request of the chairman, Mr. Strong then gave a description of the principle on which he is constructing his engine. In concluding, Mr. Strong said that before long he expected to have his locomotive completed, and would be glad to furnish the society with the results of tests made by Prof. Goss' method.

Mr. C. H. Woodbury discussed the topic "What is the best telephone system for connecting departments of large works with each other and the central office," illustrating his remarks with an apparatus in use in several places. The convention adjourned after an illustrated description of a new form of making gas, given by Mr. Matthew P Wood, and which he thinks will eventually replace the present coal oil gas. A combination of chemicals, including quick lime and carbon, is mixed and made into a compact form by means of an electric furnace. When a particle of the solid substance is combined with water, gas is generated and rises to the surface. With a quantity of this substance one could set a river on fire. The new process is now being patented, and it is expected will be put on the market inside of 30 days.

The next meeting will be held in Detroit, Mich., next summer.

Abstracts of several of the papers are given in this issue.



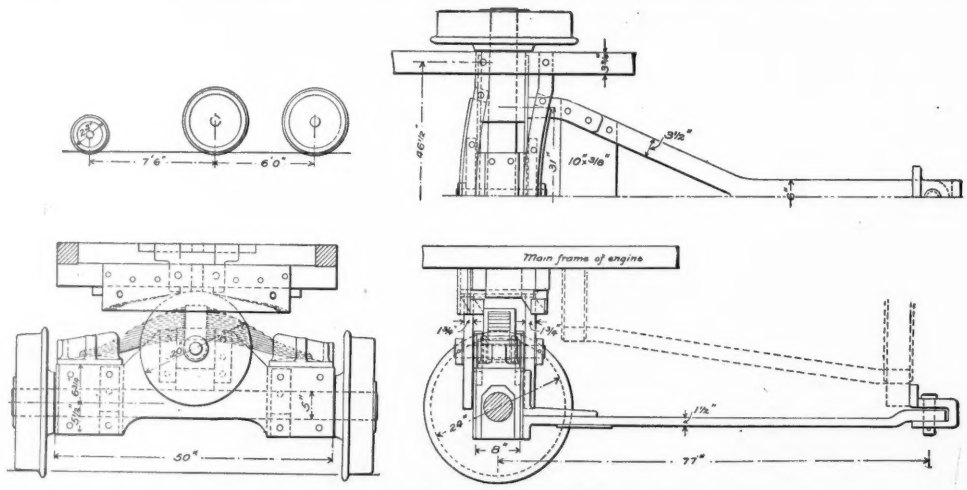
Switching Engine, for the United Railroads of Havana.

Switching Locomotive for the United Railroads of Havana.

Several months ago the Rogers Locomotive Company built a lot of locomotives for the United Railroads of Havana, among which were included, two switching locomotives. These last were designed for use on tracks in the streets of Havana, and a city ordinance requires that locomotives working on the tracks laid in the streets shall be entirely covered by a cab; this accounts for the long cab and the general exterior appearance shown in the engraving, reproduced from a photograph. The coal bunkers are placed at the back end of the cab, one in each corner, just back of the side doors. The capacity of the bunker is about one ton.

Because the tracks are in the streets, there are several curves of very short radius, the shortest being 55 ft., and these occur at points joining a tangent and a curve of greater radius, or in passing to the reverse curve. The latter occur in tracks leading to the large sugar warehouses on the east side of the bay, over which tracks, heavy loads are hauled. Such an arrangment of tracks made necessary a construction in the trailing truck, quite out of the ordinary, and the method adopted to give the truck the required swing, on such curves, is interesting.

Three views of the truck are shown in the drawings, and a short explanation will make them inteligible. Two steel plates, ⅜ in. thick, connect the two journal boxes and extend upward at the middle to form a guide,



Two-Wheeled Radial Truck,—United Railroads of Havana.

both ways, for the transverse spring. The ends of the spring rest on the journal boxes. A pin passing through the lug on the under side of the spring band, provides support for two wheels, the plane of each being transverse to, and also perpendicular to the track. Each of these wheels is 20 in. in diameter and 1¼ in. broad on the face. It is by means of these wheels that the weight over hanging above, is transferred to the spring. Above each wheel is a rail connecting the main engine frames. These rails are inclined, both sides of the center, about 1 in 8, and the amount of the incline is more or less adjustable. The rails are curved in the plane of the two frames, to a radius equal to the length of the radius bar of the truck. The two rails connect the two main frames and bear directly on the carrying wheels. To prevent the wearing of a flat spot on the rails at the central position, the track is in the middle position most of the time; a steel plate 6 in. wide is provided at the middle and its bearing face conforms to the curve of the carrying wheels. A ½-inch plate at each side of each rail, provides flanges to guide the wheels in case the truck leaves the rails. The truck can travel 14 in. each way from its central position. The incline is used to bring the truck to the central position when the locomotive leaves the curve. The "pull" toward the center with this arrangement, is about the same for all positions. This is not the case when hangers are used. The necessity for some design, other than hangers, in this case, was that the motion was too great for the length of hanger, for which there was room. On a curve of 55 feet radius the center of the truck will be about 11 in. in a lateral direction from the center line of the engine frame, at a point over the truck axle.

Some of the principle dimensions of these locomotives are as follows:

Description.

Type	4-wheel switching; trailing truck
Gage	4 ft. 8½ in
Simple or compound	Simple
Kind of fuel to be used	Bituminous coal
Weight on drivers	74,200 lbs
Weight on truck wheels	11,000 lbs
Weight, total	85,200 lbs

General Dimensions.

Wheel base, total, of engine	13 ft. 6 in
Wheel base, driving	6 ft. 0 in
Heating surface, fire-box	82 sq. in
Heating surface, tubes	820 sq. ft
Heating surface, total	902 sq. ft
Grate area	12.5 sq. ft

Wheels and Journals.

Drivers, number	4
Drivers, diameter	44 in
Truck wheels, diameter	24 in

Cylinders.

Cylinders, diameter	16 in
Piston, stroke	24 in

Boiler.

Boiler, type of	Straight
Boiler, working steam pressure	160 lbs
Boiler, diameter of barrel	54 in
Crown sheet stayed with	Radial stays

Tubes.

Tubes, number	162
Tubes, material	Iron
Tubes, outside diameter	2 in

Fire-box.

Fire-box, length	53¼ in
Fire-box, width	33½ in
Fire-box, depth front	70⅛ in
Fire-box, depth back	62½ in

Other Parts.

Water capacity, saddle tank	500 gals
Fuel space, coal capacity	2,000 lbs

Annual Report of the Interstate Commerce Commission.

A synopsis of the Interstate Commerce Commission's eighth annual report has been published, from which we extract and condense as follows:

Court Decisions.—The United States Supreme Court held in the case of the Commission against Brimson and others that Congress may employ any appropriate means, not forbidden by the Constitution, to carry into effect and accomplish the objects of a power granted to it by the Constitution, and that the judiciary can only inquire whether the means devised by Congress are forbidden by the Constitution; that Congress has plenary power, subject only to the limitations imposed by the fundamental law, to prescribe the rules by which commerce among the States is to be regulated; that the provision of the twelfth section of the act to regulate commerce, requiring the courts to use their process in aid of inquiries before this Commission, is constitutional and valid, and that a proceeding to compel the attendance and testimony of witnesses before the Commission or to compel the production of books, documents or papers, is a *case* of which, under the Constitution, a Federal court may take cognizance; that failure to obey an order of the court requiring the giving of such testimony, or the production of documents before the Commission, is properly punishable by the court as for contempt thereof.

By a recent decision rendered in the United States Circuit Court for the Western District of Kansas, formal investigation and report by the Commission may be avoided in certain cases, and a proceeding may, upon request of the Commission, be brought in court by the Attorney General in the first instance. This is expected to obviate considerable delay and prove of great utility. The defendant carrier has appealed the Grand Rapids Free Cartage case to the Circuit Court of Appeals.

The report says that the provision of the Interstate Commerce Law forbidding a road to discriminate between connecting roads in the interchange of business has been found too weak to force a railroad to haul the loaded cars of a connecting road at regular rates and yet has been successfully invoked by a railroad company to restrain its employees from obstructing business; and the Commission complains that if the law can be used in the latter case it ought also to be available in the former.*

Besides the foregoing, the report refers to other decisions of the Supreme Court, including that on the Texas railroad law and that sustaining the authority of Congress to regulate railroads through a board of commissioners. The Social Circle case, involving the long-and-short-haul section, and the case in which the United States Circuit Court of Appeals sustained the Interstate Commerce Commission in reducing the freight rates on oranges from Florida have been appealed to the Supreme Court and probably will soon be decided.

The Commission has no power to make criminal prosecutions; it can only report the facts to the Department of Justice, and "It is the duty of shippers, railroad men and citizens generally to assist the Government in running down these violations of a statute designed to protect their interests. It is time to obliterate the wholly erroneous impression that giving such aid will make a man an informer, using the term in a reproachful sense. The carrier and the Custom House each render a public service and each collects a charge upon commerce, one as a tax upon commerce and the other a tax upon its admission into the country; and the regulation and equal application of either is a governmental function in which the whole public is vitally concerned. Both the law and public sentiment condemn customs frauds as a crime meriting prompt punishment, and when public opinion shall regard transportation frauds in the same light, the serious difficulties now met with on every hand in endeavoring to convict those who wilfully violate the Act to regulate commerce will have mainly disappeared. Transportation should not be regarded as a part of the private business of shippers, it should be viewed as an agency, provided under Government sanction, upon the impartial conduct of which many industries must depend for their legitimate prosperity."

Work of the Commission.—Reference is made to the Summerville (S. C.) case in which the long-and-short-haul section was at issue and the Commissioners say: In so far as the competition of carriers promotes the welfare of persons and places without undue injury to others it should be encouraged; but when such competition plainly operates to destroy or prevent the growth of one town and build up another, it should be justly regulated. Due observance of the fourth section will encourage legitimate and restrain illegitimate competition in the carrying trade.

On the Southern freight rate war the report says: During the reduction period rates in the South were fixed according to no coherent plan, and grossly discriminating charges were collected at non-competitive points on almost every Southern road. This rate war was an ill-considered and costly effort to punish one or two competing carriers; it changed nothing; taught no lessons which had not been learned before, brought about no guarantee of future observance of rates by the parties whom the cut was designed to injure, and merely resulted in restoring the old rate situation. The great reductions kept in force for two months have led the public to believe more firmly than ever that these lines are now able to perform transportation service for much less than rates in force before and since the reduction period. The situation calls for statutory remedy and the Commission renews its former recommendation for an amendment which will enable it to limit rate reductions to competitive points.

Proceedings in the court to enforce the order made in this case are still pending.

Reference is made to the decision reducing rates on wheat in the State of Washington and to the window shade case, reported in the *Railroad Gazette* of Nov. 9.

The action of the Commission in ordering the more systematic and orderly construction and publication of tariffs is reported. Next comes a renewal of the argument, presented several times before, for authority to make a single freight classification for the whole country. "We firmly believe that a classification can be constructed with primray reference to the requirements of the law which will be a decided improvement upon those now in force."

The question is discussed what carriers and what kinds of transportation are subject to the law. It is held that the fact of continuous transportation over connecting roads is sufficient evidence of an arrangement for its performance. Any road, no matter how short, carrying interstate commerce is subject to the act. Such shipments as grain from Chicago to Buffalo by boat and thence by rail to New York over a road not interstate, should be specifically brought under the law. Traffic carried by express companies should likewise be included.

Relation of Railroad Receivers to the Law.—The attitude of a Receiver to the law is precisely that of corporations whose affairs have not been taken possession of by the Court.

Overcharges and Undercharges. — The occurrence of overcharges is usually ascribed to inadvertence, insufficient information, or failure of some official to perform his duty, but the files of the Commission teem with complaints of delays by carriers in the settlement of overcharges which, in the nature of things, could not have been necessary. There is no justification for delay in the payment of overcharges. Carriers should employ competent agents, keep them informed and invest them with full authority to correct errors. The carrier who collects the freight should be held responsible for summary settlement and repayment of excess charges. Undercharges are likely in some cases to be more damaging to shippers and consignees than overcharges. An erroneous undercharge is almost certain to be corrected before delivery of freight to the consignee. Contracts before shipment based on a quoted underrate, are thus often rendered wholly unprofitable. The shipper of household goods might not have forwarded his effects if the true charge had been named before shipment, and previous quotation of the actual rate might have changed his plan or place of living. These serious considerations are not answered by the fact that injured parties have a right of action in the Courts. Patrons of railways should never find it necessary to bring suits for the recovery of damages growing out of the use by a carrier of rates not fixed according to law. Everyone is invited to write or telegraph to the Commission for authentic rates.

Changes in Transportation Charges. — Important and far-reaching reductions are often made by placing commodities in a lower class of the classification. The proportion of articles carried at less than carload rates under the Official Classification in 1887 was 55.07 per cent., and those charged carload rates was 44.93 per cent., while now 38.45 per cent. take less than carload rating and 61.55 per cent. have carload rates. This variation of 17 per cent. embraces many important changes. If the average receipts per mile on passenger and freight business in 1888 had been charged on the volume of traffic carried during the succeeding five years, the public would *in that case* have paid $525,459,587 more than was actually charged during that period. This indicates the great bearing which largely increased volume of traffic has upon railway rates. Whether there would have been any reduction in rates if the traffic from 1889 to 1893 had remained as small as it was in 1888 the Commission cannot undertake to say. The average freight rate per ton per mile in 1888 was 1.001 cents, while for the year ending June 30, 1894, it was .866 cents. During the latter half of 1894 several important advances in rates took place throughout the country.

Through Routes and Through Rates.—The through-routes and through-rates provision of the law is practically inoperative on account of the limited meaning which has been given to its language by the courts, and the fact that the statute does not provide means by which a reasonable joint rate can be required and established. This is one of the most embarrassing of all of the discovered defects in our scheme of railway regulation.

After spending more than 60 years in the development of a system of railway service which shall meet the needs of an ever-increasing volume of commerce; after building and putting into operation nearly half the railway mileage of the world; after aiding the construction of long trans-continental lines by immense grants of lands and national credit, with a principal view to through transportation at relatively low charges, not only over such aided lines, but over those which might choose to connect therewith; after passing a federal statute more than 28 years since, providing for the physical connection of railway tracks of different carriers so as to form continuous lines of transportation, and thereby freeing the carriers from any trammels upon the formation of such continuous lines and transportation thereover; after passing a general regulating statute in which the duty of performing such continuous transportation at duly published and reasonable rates and without undue preference or discrimination in favor of persons, communities or kinds of traffic is distinctly imposed—after all this effort and time, we are forced to realize that the progress of communities and the prosperity of persons which are so greatly influenced by fair or unfair railway service and railway rates over connected roads, still depends very generally upon the inclination of carriers to enter into joint through-rate agreements. The location of new business enterprises is frequently settled, since the passage of the Act to regulate commerce, as well as before, not so much by the wishes of those who control them and the advantages for economical production or trade afforded at particular places, as by the favorable transportation rates which railway managers can be induced to put in force.

Joint rates over connecting roads are no longer a public convenience which the carriers are only able to afford through great economies in operation and because of very considerable offerings of traffic; they have become a commercial necessity. There can be no valid objection to vesting the regulating authority with power to order through routes and through rates. This power has been exercised by the English Commission for years. The Commission renews the recommendation for amendment of this clause set forth in its last report.

Pooling.—It may be conceded that much of the effort now being made to remove the prohibition against pooling is largely prompted by the diminution of railway revenue caused by open and secret cutting of competitive rates, and it is also generally believed that a restraint upon competition which will prevent rate-cutting is necessary to the successful operation of the law; but there is the widest difference of opinion as to the means to be employed. If the detrimental features of the trust cannot be eliminated from the pooling proposition it should be discarded; but if this can be accomplished we should not refuse consideration of the plan merely because unregulated pooling would be objectionable.

But a safe plan of conditional pooling is not sufficient for present needs. Though such a plan may appear to be a remedy for many abuses, there are others equally grave, which cannot be cured without further specific legislation. The pooling proposition would receive little countenance if civil and criminal violations of the law were not so numerous. The prevention of these violations must be the specific object of any amendment. Adherence to the pooling agreements by the carriers cannot be assumed.

Rates established under pooling contracts would not be in effect at numerous places which are competing for trade with localities where the pooling rates would be in effect; and thus, by operation of the proposed law, one set of rates would be made by individual carriers, while control of the other set would be *legally exercised* by or through the pool. It seems clear to us that points not covered by the pooling contract should receive as ample protection in conditional pooling legislation as those which may be directly affected by the pool, and that any additional authority which may be conferred upon this Commission to annul or modify the pooling contract, and control rates or facilities maintained under or affected by the pooling contract, should also extend to rates and facilities which are *not* maintained under or directly affected by the contract.

Pooling advocates claim that pooling contracts can have no effect upon competitive rates except to promote their maintenance and observance. We do not think this a sound proposition. A common agreement as to rates and their observance is necessary to the successful operation of the pool. It is beside the question to say that throughout the old pooling territories competitive rates have been agreed upon by the carriers since pooling was prohibited. Continuance of rates in force has nevertheless been voluntary, while under these contracts established rates would be kept in effect until the parties thereto agreed upon a change; and it is plain, moreover, that a substantial advantage accrues from an arrangement for a division of earnings which would make a carrier willing to keep rates in force that without it would be reduced. The effect of a legalized pooling contract upon rates would be, therefore, to require the parties to agree while now they only do so voluntarily. It is folly to suppose that a combination of carriers would not, in the absence of legislative restrictions, have immensely greater power over rates than those possessed by individual carriers, or that such power would not be exercised in the direction of higher rates if it should appear that the private interests of the carriers would be served by such action. Pooling without other remedial legislation is unadvisable. Pooling under conditions to be approved by the Commission and rendered capable of easy and direct regulation, with accompanying effective remedial legislation, we believe might safely be tried. Amendments recommended to Congress in this and former reports should be adopted. Each of them is necessary to remedy some existing transportation evil, and some of them would accomplish reforms and public benefits indispensable to the original purposes of the act.

The Strike.—The Commission explains why it did not investigate the great strike, the principal reason being

*Reference is here made to the decision of Justice Field in the case of the Oregon Short Line versus the Northern Pacific, June 15, 1892, wherein it was held that the latter road need not accept the freight cars of the former if it had sufficient cars of its own on hand; and to the Ann Arbor strike case where an engineman of the Lake Shore & Michigan Southern refused to haul cars going to the Ann Arbor road, while expressing his willingess to move all other cars, and was punished for it.

that Congress was in session and that a strike commission was appointed. If another strike should occur the Commission might feel called upon to investigate, and says: The Commission should have authority to enter upon immediate investigation when strikes or lockouts are apprehended, have the testimony of all persons, and the aid of judicial process to compel such testimony, and to enforce proper recommendation based upon the investigation.

Financial Condition of Railroads.—On June 30, 1894, there were 156 roads in the hands of Receivers; mileage about 39,000 miles; capitalization upwards of $2,500,000,000, or 25 per cent. of the total railway capital of the country. Eighty per cent. of the mileage, and 79 per cent. of the capitalization is accounted for by 28 of the more important of such roads. Many of the receiverships were the natural sequence of mismanagement, over-capitalization, and ill-advised projections. It is possible that a large amount of competitive traffic has been handled at a loss to the railways. It is believed that had reasonable rates been maintained, the revenue from the traffic would have been more nearly adequate to meet the fixed charges of the road, and the extent of the financial disaster much less.

Statistics.—On June 30, 1893, there were 176,461 miles of line in the United States, being an increase during the year of 4,897 miles. The number of railway corporations was 1,890, being an increase of 68 over the previous year. Of these, 939 maintained operating accounts, and 778 were subsidiary lines, 28 roads were merged, 20 roads were reorganized, and 16 roads consolidated into other systems. There were 42 operating companies having a mileage in excess of 1,000 miles. The capitalization of the roads reporting was $10,506,235,410, equivalent to $63,421 per mile of line. The gross earnings were $1,220,751,874, the operating expenses $827,921,299, leaving net earnings of $392,830,575, which is equivalent to $2,314 per mile of line. Adding to this the income from other sources to the amount of $149,649,615, gives as the amount available for payment of fixed charges and dividends, $542,482,190. From this there were paid $431,422,126 as fixed charges; dividends and other payments from net income, to the amount of $102,941,289, leaving a surplus of $8,116,745. The number of employees was 873,602, being an increase over the previous year of 52,187. The number of employees killed was 2,727, an increase of 173, and the number injured was 31,728, an increase of 3,462. The number of passengers killed was 299, being a decrease of 77; the number injured was 3,229, being an increase of only 2 over the previous year. A preliminary income account for the year ending June 30, 1894, will form an appendix to the report.

Recommendations.—1. That power be conferred upon the Commission to prescribe minimum as well as maximum rates. 2. That section three of the statute be amended so as to provide a procedure for the establishment of through routes and through rates. 3. That the Commission be directed to prescribe a uniform classification for freights. 4. That the Act be amended so as to connect the contract of shipment and its performance by the carriers with their duty to charge only such rates as have been put in force according to law. 5. That the procedure provided in the statute for enforcement of orders of the Commission be amended as suggested in former reports. 6. That mutilation, destruction or removal of any tariff posted be made a misdemeanor punishable by suitable fine. 7. That corporations subject to the Act be made liable to indictment for offenses against the statute; and that the present provisions subjecting individuals engaged in railway service to punishment by fine or imprisonment for prohibited acts be retained, but that shippers, consignees, and individuals not connected with railway employment, be relieved from liability to fine and imprisonment under section 10, except for such fraudulent acts as false billing, false classification, false weighing, false representation of the contents of packages or false report of weight.

8. That a law be enacted allowing appeals or writs of error on behalf of the Government in penal cases which involve construction of the Constitution of the United States, or in which a demurrer to the indictment has been sustained or motion in arrest of judgment granted.

9. That the word "line" when used in the Act, shall be construed to be a physical line, not a business arrangement, and the words "any common carrier" as used in the Act shall be construed to mean one or more than one common carrier as in the application of the law may appear to be required.

10. That any amendment of the anti-pooling law shall be in accordance with the suggestions in this report.

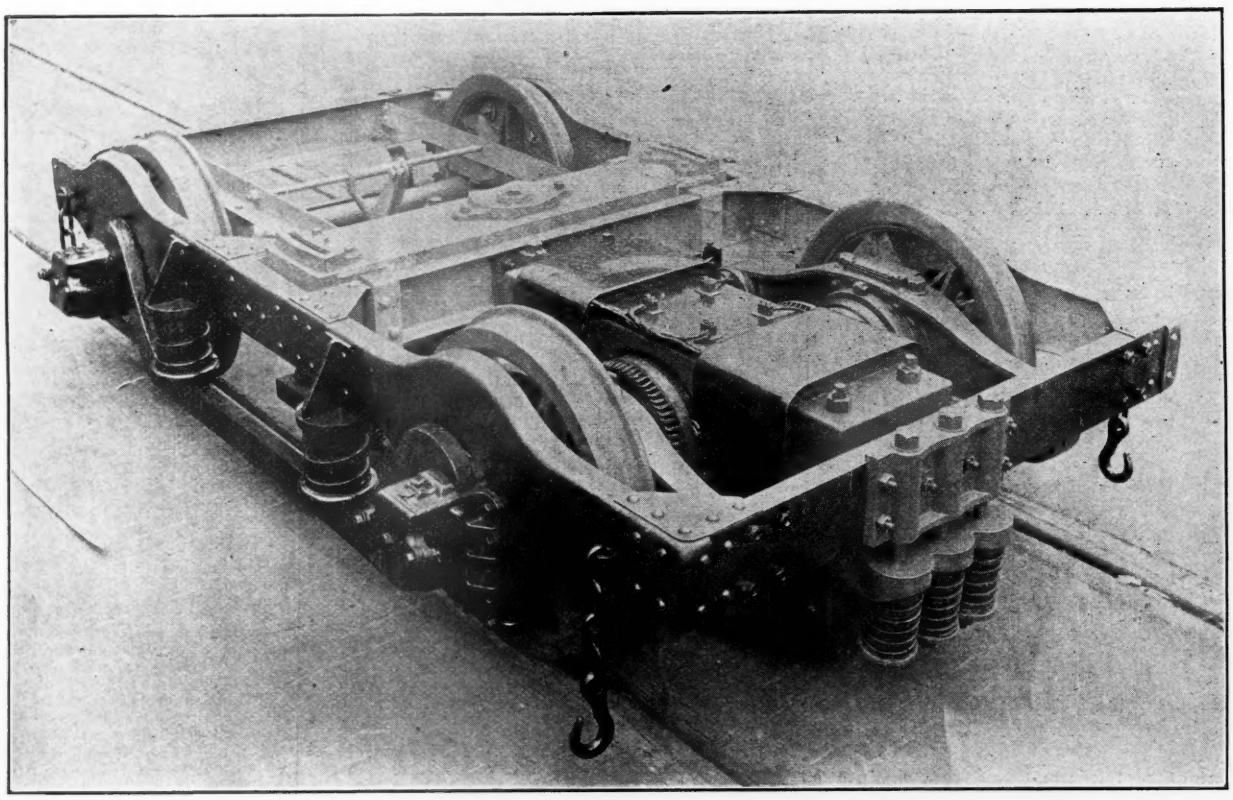
11. That the provisions of the Act be made to apply to all transportation of interstate commerce over rail or rail and water lines, and to all common carriers, corporations, companies, firms, and persons in any wise engaged in such transportation, or owning lines, cars, yards, or properties used in connection therewith.

12. That section 20 of the Act be amended so as to fix the time within which carriers shall file annual reports with the Commission, and a money penalty for failure, and also provide for the enforcement and collection of such penalty; that this section be further amended so as to require such reports to be verified by oath before an officer therein specially authorized to administer such oath, and that any person making oath to any false statement in any such report shall be liable to indictment and conviction for perjury.

In addition to the recommendations for amendment above specified, attention is respectfully called to the various considerations set forth in the body of this report as demonstrating the necessity for legislative action. We also beg to refer to the suggestions herein made in regard to legislation authorizing the Commission to investigate threatened labor contests on railways, and to require annual reports from various companies whose business is closely related to that of transportation.

Motor Truck of the Liverpool Overhead Railway.

We reproduced in the *Railroad Gazette* of March, 16, 1894, parts of a paper read before the Institution of Civil Engineers (London) in February. The paper described the construction, equipment and results of operation of the Liverpool Overhead Railway and was supplemented by one on the electrical equipment of the road, by Mr. Thomas Parker, engineer for the Electric Construction Company. It was this company which provided the equipment for the road. We gave also, illustrations of the cars and trucks and traction diagrams reproduced from the illustrations of the papers. We now show an engraving, reproduced from a photograph taken from one of the motor trucks; gives a much better idea of the construction of the truck, because it shows nearly all the details.



Motor Truck—Liverpool Overhead Railway.

The truck frame is made of pressed steel; the two middle channels forming the truck transom and the two end pieces are riveted to the side frames. Excepting the special parts, which adapt it to the equipment attached to it, the truck much resembles American construction. The spring-plank, suspended from the truck transom, supports the truck bolster. There are equalizers, the ends of which rest on the journal boxes, and the upper pockets of the equalizing springs are bolted to the wheel pieces. The wheels are of wrought iron, spoked and are 33 ins. in diameter. There is one motor on the truck and only one motor truck to a car. The motor is spring suspended from the truck transom and end piece, as is clearly shown in the engraving. The wheel base of the truck is 7 ft., and the distance from center to center of trucks of each car is 32 feet. The total length of each car is 45 ft., and the width, 8 ft. 6 in. Each car seats 16 first-class and 41 second-class passengers.

The motor is of the gearless type, and its maximum speed 300 revolutions a minute for a car speed of 30 miles an hour. The starting torque is sufficient to give 2,000 lbs. pull at the draw bar. The motor and attachments necessary for the electrical equipment for motive power add about 7 tons to the weight of the car; the motor weighs somewhat above 6 tons. The gearless motor for elevated railroad traction is more costly in the first instance, but it is certain, efficient and reliable.

The truck shown was furnished to the Liverpool Overhead Railway by the Electric Construction Company, Limited, of London and Wolverhampton, England. The Elwell-Parker Electric Company, of America, having works at Cleveland, Ohio, is the American incorporation of the same company. Mr. J. Holt Gates is General Western Agent, at Chicago, for the latter company.

One of the Latest High Buildings.

Among the tall buildings now being constructed in New York City is the American Tract Society's Building, on the Corner of Spruce and Nassau streets, which occupies a lot having about 100 ft. front on Nassau street, and 94 ft. front on Spruce street. The location is in the vicinity of the great newspaper buildings, and a view of the building when finished will be had from Broadway, across the open space of the City Hall Park. This building will be twenty-three stories high; the height of the main roof beams above the street curb stone being 240 ft., and the finial 66 ft. higher, making 306 ft. from curb to finial. The corresponding dimensions for some of the other tall buildings in New York are as follows: Height from curb to finial for the Manhattan Life Insurance Building is 350 ft.; for the World Building, 309 ft.; for the American Surety Building (now in process of erection, at Broadway and Pine street), is 302 ft.; for the Home Life Insurance Building, 277 ft.; height from curb to main roof beams, for the American Surety Building, 300 ft.; for the Manhattan Life Ins. Building, 242 ft.; for the Home Life Ins. Building, 205 ft.; for the World Building, 194 ft. From these dimensions it is deduced that height of the main roof beams bears the following ratio to the total height: for the World Building, 62 per cent.; for the Manhattan Life Building, 69 per cent.; for the Home Life Ins. Building, 74 per cent.; American Tract Society, 78 per cent; the American Surety Building, 99 per cent.

The highest of these five buildings, viz.: the Manhattan Life Ins. Building, is 63 ft. higher than the top of Trinity Church spire, and the average height of all five is 22 ft. above Trinity Church spire.

In arranging for the foundations of this building seven borings were made (distributed over the whole lot), to an average depth of 76 ft. below the curb, the deepest being 105.5 ft. These borings showed a layer of clay averaging 8 ft. thick, at an average distance of 38 ft. below the curb, the level of mean high tide being 35 ft. below the curb. Under this layer of clay was found fine sand, and beneath that still, very fine sand. At no point was rock touched; and from this it was concluded that foundations requiring caissons to be sunk to solid rock, such as have been used under the Manhattan Life Building and the American Surety Building, would not be enough better than pile foundations to make up for the very considerable difference in cost. The caissons under the Manhattan Life Building rest upon rock 54 ft. below the Broadway curb, and those under the American Surety building 71 ft. below the curb; whereas, in the case of the American Tract Society Building similar foundations would have had to extend down at least 100 ft. below the curb, and probably more, to rest upon rock. A compromise might perhaps have been made by resting the caisson foundations in the sand at no great depth, but pile foun-

dations were decided upon; and piles 10 to 14 ins. in diameter at the head, varing from 15 to 40 ft. in length, were driven as close as possible. Under some of the heaviest reactions, it was necessary to drive these piles 18 in. to 20 in. center to center, and some difficulty was experienced in driving the last few of each clump. They were driven with a 2,000-lb. hammer, falling 10 ft. to 22 ft., and in most cases they sunk less than 1 in. under the last blow. All piles were cut off at the level of mean high tide, viz.: 35 ft. below the curb.

The heads of the piles were imbedded in 16 in. of concrete immediately over which was placed a 10 in. course of granite blocks. On this a brick pier was built in "stepped up" courses and capped with a 12 in. granite course, on the top of which was placed a granite block 18

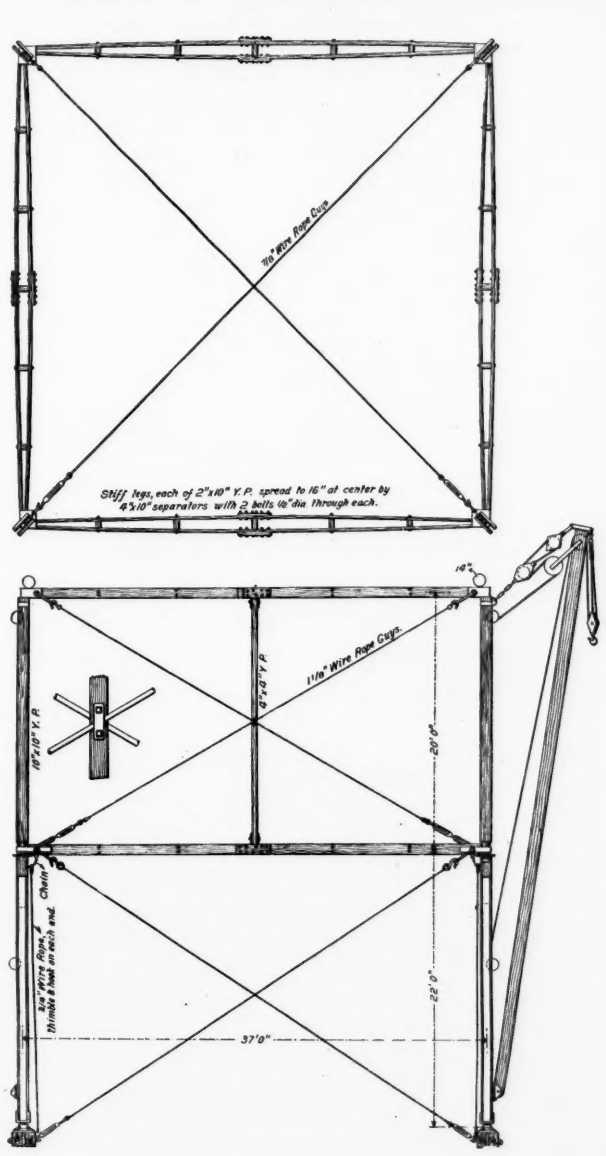


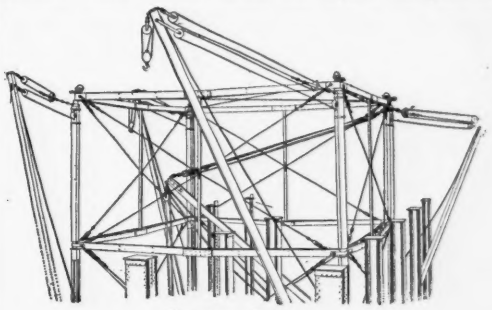
Fig. 2.—Plan, Elevation and Details of Erecting Plant.

length of the overhanging portion and the available depth are important factors in determining whether to be economical the cantilevers should have a solid or an open web.

In the American Tract Society Building three outside columns on the east side and three outside columns on the south side are supported on the ends of steel cantilever trusses of triangular shape, each about 12 ft. deep and 40 ft. long; extending back into the interior of the building to include two anchorage columns. The sizes and dimensions of these six cantilevers vary somewhat with the loads to be carried, but they are substantially alike in construction.

Figure 1 shows the plan and elevation of one of these pairs of trusses. Each cantilever is composed of two trusses, one passing either side of the anchorage columns and being connected to these columns by inverted brackets. The pairs of trusses vary in weight from the lightest, which is 18 tons, to the heaviest, which is 31 tons; making each truss of the heaviest cantilever about 15½ tons in weight, exclusive of the brackets and the short cross girders which support the columns. This cantilever was figured to carry 748 tons on the free end at a distance of 7 feet from the centre of its base.

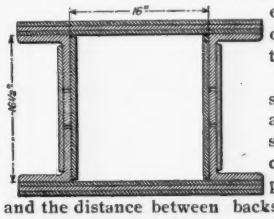
As will be seen in the detailed drawing (Fig. 1) each of these trusses was shipped in four pieces. Two of these six cantilevers support a column mid-way between the anchorage columns and the end, besides the end column. All the supported columns rest on short box or plate girders, which extend across the tops of the pairs of



Erecting Rigging.

trusses, and vary in size according to distance between the members of a pair and the load to be carried. All connections are riveted, and the sections of each member are double or box sections, as shown.

All columns and cantilevers in the cellar rest on cast iron bases, the largest single casting weighing 3½ tons. The bases for the cantilevers are in pairs, one base for each truss. The heaviest of these pairs weighs six tons.



The columns are constructed of steel angles and plates, forming box sections. The largest cellar column has three 28 in. plates on each of two sides, and the distance between backs of angles in the other direction is 16½ in. This column has a section of 153 square inches, distributed as follows:—

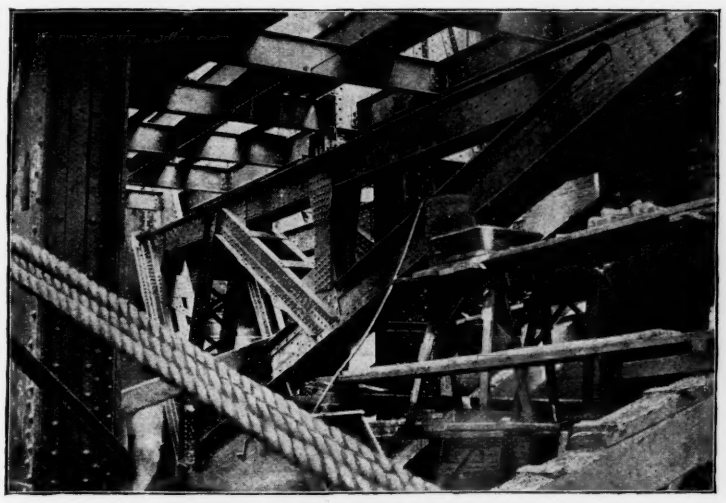
4 plates .....28" × ½"	2 webs.....16" × 5/16"
2 " .....28" × 7/16"	2 " ..... 4" × ¾"
4 angles ...6" × 6" × ¾"	2 " ..... 14" × 7/16"

and weighs 520 lbs. to the foot.

The computations for the design of all cantilevers, columns and girders in this building were made by Wm. W. Crehore, Assoc. M. Am. Soc. C. E.

To serve as wind bracing and stiffening between columns, above the third story all around the courts there are to be lattice girders 3 ft. 10 in. deep, extending from the lintels of one story to the sills of the next, and on the lower flanges of these girders the floor beams will rest.

A feature of this work is the erecting plant which was designed by the Atlas Iron Construction Co., the erectors of the iron work. This plant is shown in Fig. 2. On plan it measures 37 ft. x 37 ft.; it is 42 ft. high, and is divided into two panels by horizontal bracing near the middle. The four corner masts are so placed in the building as not to interfere with the setting of any beams or columns. The lower panel is a little more than two stories deep, so that two tiers of beams and columns may be set before raising. There is a boom on each corner,



First Cantilever on the Nassau Street side.

Second Cantilever on the Spruce Street side.

Foundations of American Tract Society Building.

in. thick to receive the cast iron base of a column or cantilever. This brought the bottoms of the cast iron bases to the level of 27 ft. and 9 in. below the curb-stone.

The columns in this building are spaced about 19 ft. apart in one direction and 17 ft. 9 in. in the other. Columns which are located at or near the property line cannot be provided with proper foundations whose centers

capable of swinging through 270 deg., and a fifth one inside, swinging from the southwest corner. All five can be used at the same time, and they are so arranged as to cover the whole lot and permit all the columns and beams of two tiers to be set without shifting. In raising this traveler two independent masts are placed on opposite sides resting on the highest tier of beams erected. The whole plant is then raised at once, the wire rope sway

bracing of the lower panel having been first unhooked. When the bottoms of the masts reach the height of the highest tier of beams, two 8 in. x 12 in. sticks are thrown across as supports, and the sway bracing is replaced. The work of lifting this plant or traveler the first time occupied about 10 hours, including the preparations and final adjustments, but it is expected in the future to raise it each time in less than half a day. The total weight of this traveler is 16 tons. The capacity of each derrick is 10 tons. From the design it is seen that lightness and rigidity have been carefully studied. The lower half of each mast is composed of two 10 in. I beams, spaced 9 in. apart, and securely tied at intervals. The upper half is a stick of 10x10 timber, which is let in between the I beams about 2 ft. and securely bolted. To compensate for the fact that this splice in the mast comes near the middle, there is horizontal bracing in two directions, 2 ft. above the splice. At the top of the mast, instead of the usual cast iron gudgeon, is a piece of extra heavy 3-in. pipe 2½ ft. long, through which the rope passes between the two upper sheaves of the mast. Each member of the horizontal bracing is composed of two 2 in. x 10 in. pieces of yellow pine, spread to 16 in. at the center by 4 in. x 10-in. separators with two bolts through each. The sway and top lateral bracing is made of 1⅛-in. wire rope guys provided with hooks at one end. There is no diagonal bracing to obstruct free play of the inside boom. The best test of the structure's capacity, which has been made, was when loads of 7, 6 and 5 tons were swung on three corners at the same time. Lighter loads have been swung from all the booms at once.

After spending nearly a week in putting up the erecting plant, hindered by unfavorable weather and under the disadvantage of having to begin work before the foundation contractor was out of the way, the Atlas Co. began the actual work of setting the iron on Monday, Nov. 5. Since then, in spite of unusually rainy weather, everything has been set to and including the 6th tier.

The architect of this building is R. H. Robertson, of 160 Fifth avenue, and the contractor for the iron work, Carnegie Steel Co., Limited, for whom the Atlas Iron Construction Co., of New York, is doing the erecting.

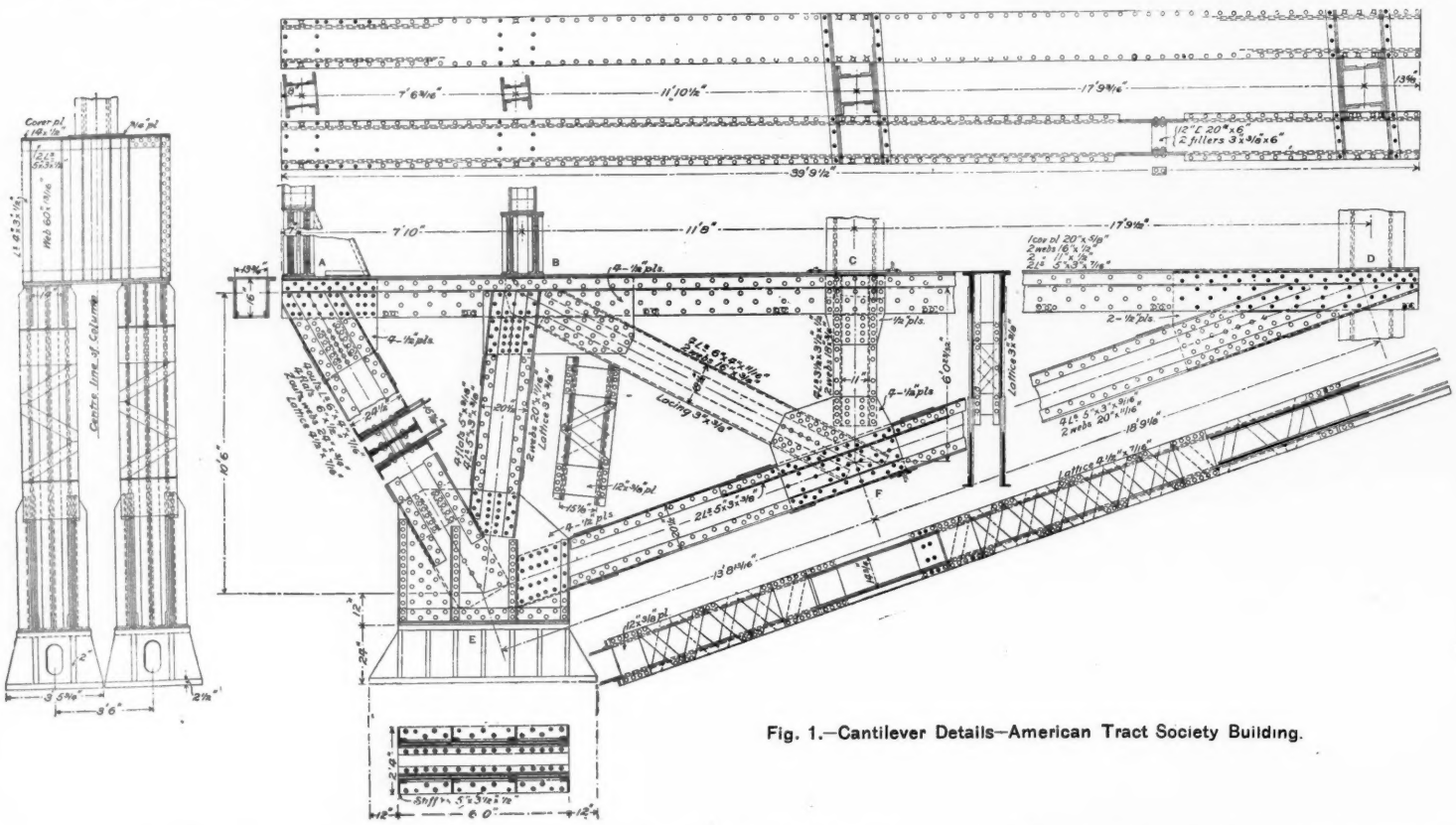


Fig. 1.—Cantilever Details—American Tract Society Building.

The Lake Iron Ore Traffic for 1894.

The careful statistics annually gathered by the *Marine Review* and the *Iron Trade Review*, both of Cleveland, O., place the shipments of Lake Superior iron ore, by water, for this season, at 7,776,547 gross tons. The following table shows the total shipments by water and the proportion passing through the "Soo" for three years:

Year.	Total by Lake.	Via the Soo.	Percentage through the Soo.
1892	8,545,313	4,376,001	51.21
1893	5,880,918	3,584,425	60.95
1894	7,776,547	5,843,434	75.14

This very noticeable change in the proportion of Lake Superior ores shipped via the Sault Ste. Marie, is explained in great part by the growth of Mesaba ore mining, as is shown by noticing that in the following table Escanaba and Gladstone are the only ports not on Lake Superior, and that in addition to the 1,369,252 tons shipped from Duluth, 424,736 of the tons credited to Two Harbors were from the Mesaba range, making an aggregate of 1,793,988 tons, which is a little over 23 per cent. of the total lake shipments.

WATER SHIPMENTS OF IRON ORE FROM ALL LAKE SUPERIOR PORTS—GROSS TONS.

	1894.	1893.	1892.
Escanaba	1,643.000	2,048.981	4,010,085
Marquette	1,433,872	1,086,934	1,026,338
Ashland	1.738.590	1,117.524	2,223,683
Two Harbors	1,373.253	903,329	1,165,076
Gladstone	218,580	203,585	115,886
Superior	.....	80,273	4.245
Duluth	1,369,252	*440.292	.....
Total by lake	7,776,547	5,880,918	8,545,313
Total all rail	.....	178,037	528,930
Grand total	.....	6,058,955	9,074,243

IRON ORE RECEIPTS AT LAKE ERIE PORTS—GROSS TONS,

Ports.	1894.	1893.	1892.	1891.	1890.
Toledo	158,384	145.515	139,987	191,105	164,295
Sandusky	23,043	4,464	49,736	105.907	174,596
Huron	172,775	137,700	65,000	14.910	1,200
Lorain	150,424	165,667	190,400	266.009	280,450
Cleveland	1,624,573	1,260,716	1,950.224	1,257,775	1,945,492
Fairport	976.222	792,517	866,611	699.434	1,096,408
Ashtabula	1,987.722	1,845,738	2,555,416	1,599.785	2,176,730
Conneaut	237,905	203,207	1,130	.....	.....
Erie	624.438	469,297	645,230	393,759	487,493
*Buffalo	395,339	308,238	197,000	410.000	548,000
Total	6,350,826	5,333,061	6,660,734	4,939,684	7,874,664

* Includes 90,339 tons shipped to Tonawanda.

Nearly all of the ore not shipped to Lake Erie ports goes to Chicago and Milwaukee. The amounts and percentages have been as below:

Iron ore shipped to other than Lake Erie ports.

1892	1,884,579	22.06 per cent.
1893	547,857	9.32 "
1894	1,425,772	18.33 "

IRON ORE ON DOCKS LAKE ERIE PORTS, DEC. 1—GROSS TONS.

Ports.	1894.	1893.	1892.	1891.	1890.
Toledo	96,157	92,911	71,409	122.515	110,740
Sandusky	77,004	78,439	87,500	122,000	115.000
Huron	147,632	89,000	45,000	14,910	1,200
Lorain	223,733	201,633	147,600	250.812	210,257
*Cleveland	1,441,785	1,163,930	1,347,992	1,114,762	1,209,467
Fairport	660,980	578,033	610,609	597,617	721,000
Ashtabula	1,439,119	1,296,431	1,312,658	903,957	1,151,397
Conneaut	199,365	91,337	.....	.....	.....
Erie	454,233	359,827	401,683	252,916	248,714
Buffalo	94,239	119,170	125,000	129,000	125,732
Total	4,834,247	4,070,710	4,149,451	3.508,489	2,893,487

* Includes amount at furnaces of Cleveland Rolling Mill Company.

Comparing the amounts left on docks with the receipts of the season we see that 5,587,288 tons have been moved or consumed during the year ending with December 1st.

Economy Everywhere!

One who sets out to reduce expense on a railroad has a broad field. Some features of this problem have lately been noticed in these columns, notably in a contribution by Z. Y. X., Nov. 2, and editorials Nov. 23 and Dec. 7. But the economizer who gives his whole attention to "small things" may forget larger ones; whereas the need is for constant care as regards *both* large and small; in other words, to practice economy everywhere. To do this one cannot trust to his memory or to the usual fashion of a half day's visit to a shop or yard without taking one's gloves off. An inspection, to be satisfactory, must cover the subject in hand whether it take two hours or two weeks. As an aid in doing such work systematically a committee which recently went to all necessary points on several thousand miles of road took along copies of the memorandum printed below, which we copy as likely to be of value to other roads. No two roads would demand precisely the same list of questions, but the fact that a list is necessary is strongly impressed on the mind by a glance at these questions. To give due attention to 32 questions without pinning oneself down to written answers is practically out of the question. Some of these questions may possibly remind the reader of school room studies, but this criticism (if it be a criticism) is answered by the statement that every one of the questions represents a point on which improvement was actually effected at one or more places on the road where the list was used.

MEMORANDUM IN REGARD TO COMPARISON OF METHODS IN MOTIVE POWER DEPARTMENT, DECEMBER, 1894.

Are the standards laid down by the management being followed?

Have they been found faulty in any respect?

Are the steam producing and heating plants in the various shops doing good work, as far as arrangement of details and care in use are concerned?

Can they be improved readily without going to any material expense?

Are the methods of shop and office heating the cheapest and most efficient that can be used, without material overhauling of the same?

Can any improvement be made in economy of shop or yard lighting?

Are the various steam engines and other steam using apparatus dong economical and efficient work?

As far as possible it would be well to examine water station engine plants also.

Is the shafting in good shape, and do the tools seem properly speeded?

Are the tools arranged both as to grouping, and also the individual handling of each tool, to do the best work; and the use of oil, both on shafting and tools, well looked after?

Does the shop supervision and discipline seem good?

Is the making of small tools and other shop appliances properly checked, so that foremen will not spend too much money in this direction?

Are the proper means used without much expense for taking advantage of the various methods of saving time and force at some places by means of compressed air or other special tools?

Are they making anything at the shops that could be bought more cheaply, or vice versa? Prices are changing more or less just now.

When engines or cars are in the shops for special repairs, is work done on other parts which need not have been done until there was need of general overhauling?

Is higher mechanical finish put on any of the work than efficiency and economy demand, or is too high priced material used for any purpose?

Is all material, either new or old, around the shops proper, properly cared for, or disposed of, and are the yards, floors and tools neatly kept, and are all small tools well cared for?

Is there any direction in which too much time or material seems expended in shop practice, especially as regards common labor, or damage to material in working?

Is scrap material used as far as can be economically done before calling for new? This applies to metals and lumber to be worked up, and old wood, shavings, etc., to be used as fuel.

Do the forms of shop requisitions, orders, time books, etc., used seem a complete check upon expenditures?

Is there a good system of handling material, and the transmission of orders and messages from shop to shop, so as to save the time of men going from place to place?

Is any locomotive or car material carried at the storehouses that the Mechanical Department does not need, or is there any accumulation of supplies or unstandard material?

Is all second-hand material that can be used elsewhere reported on the surplus list?

Are the shop yards so policed that every foot is under the charge of some one official, and any material not belonging to the department in charge of the yard, reported to the proper parties, or otherwise disposed of?

Can shop office methods be improved upon to keep all necessary records at less cost?

Is the condition of engines kept up as regards freedom from throwing fire?

Are the methods of clinkering, coaling and sanding engines efficient and economical?

Is the engine coal supply so arranged that uniform quality is furnished at the shop in question?

Are any more engines kept in service than the the traffic seems to demand?

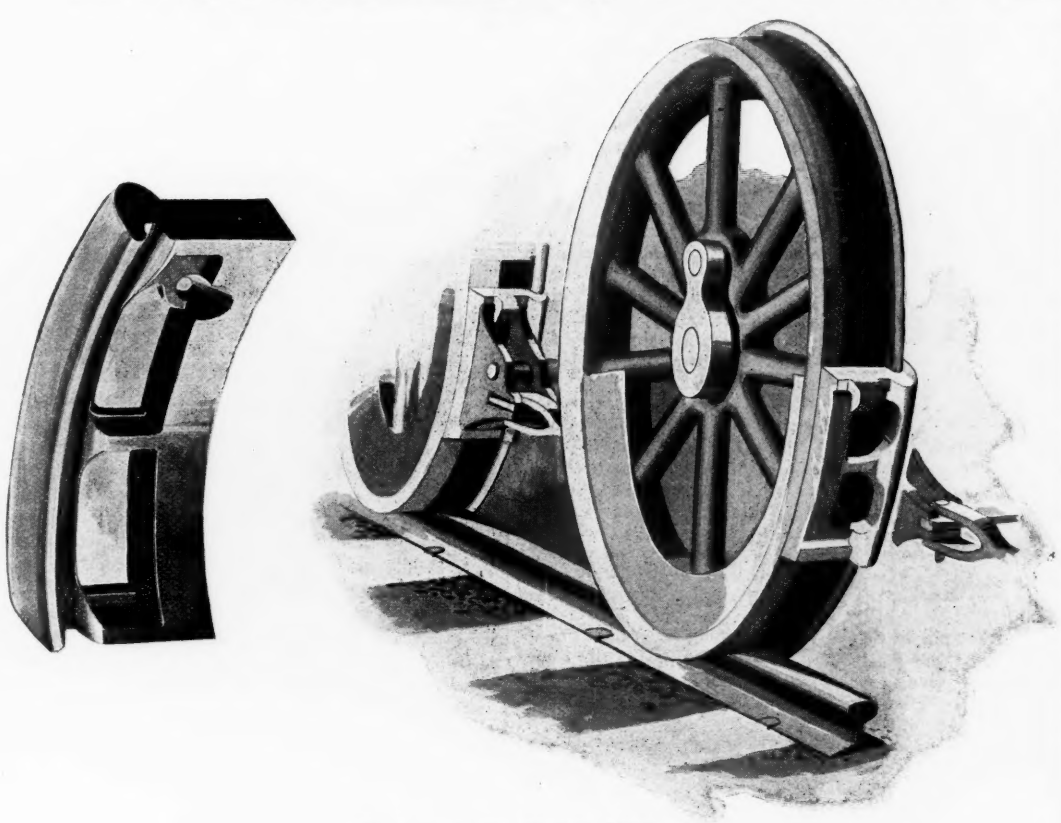
Do the trains seem properly loaded from the motive power standpoint so as to get the best work out of engines?

Is there any unnecessary movemenet of light engines?

Are the road foremen keeping a constant watch of the working of the different men and engines, as regards proper handling of engines, and use of fuel and supplies?

The Sargent Tire Dressing Brake Shoe.

Until recently, all attempts to design a brake shoe that should wear on the tire of a steel tired wheel at such points as are not worn by the rail, and so to keep the tire well dressed at all times, have been confined to an effort to distribute in the cross-section of the shoe the metal of the shoe, in such a manner as to compensate for the rail wear on the tire. The Sargent Company decided sometime ago that the metal of the shoe could not be properly distributed in the cross-section to give the desired results, and for several months has been working on the idea that the proper distribution could be obtained in the plan or the wearing face of the shoe. The company has been working for several months developing, in actual service, a brake shoe designed according to the new idea, and has recently placed upon the market a shoe of such design.



The Sargent Tire Dressing Brake Shoe.

The engravings show the relative positions of rail, wheel and brake shoe, and shows, also, the design of the shoe and how the metal is distributed in the plan so as to give the amount of wear at the various points necessary for the proper dressing of the tire. That part of the brake shoe which bears on the part of the tire projecting outside of the rail is solid; so, also, is that part of the shoe which bears on the flange of the tire; connecting the two solid parts, are three ribs, and the metal that would fill the spaces between the ribs represents the action of the rail on the tire.

Or to be more explicit, the rail wears from the tire an amount of metal that would be worn off by the metal that is lacking from the brake shoe to make the shoe solid. It will be observed that over that part of the tire that is worn by the rail there are three narrow bridges in the shoe, and these are supposed to be just about enough to keep this part of the tire circular by grinding off any high spots. Over such parts of the tire as are not worn by the rail, the brake shoe is solid. The variation in the amount of metal in the shoe between these extremes is inversely as the action of the rail on the tire.

The shoe shown in the engraving is essentially a tire dressing shoe. For driving wheels it is recommended by the company to be made of cast steel, of the proper composition, to give best results in maximum holding power and in dressing effect on the tire. The tires of coach wheels are worn less rapidly by the rail, and there is less necessity for wearing down the tire by the brake shoe; therefore, a cast-iron shoe of high grade metal is recommended for coach-wheels.

TECHNICAL.

Manufacturing and Business.

Among recent shipments made by the Industrial Works of Bay City, Mich., have been a special steam crane for service in the yards of the Lukens Iron & Steel Co., Coatesville, Pa.; high capacity locomotive steam cranes to the Edgar Thomson Steel Works; Jones & Laughlins, Lim., and the National Tube Works Co.; pillar and transfer cranes to the Chicago, Rock Island & Pacific, Cincinnati, Hamilton & Dayton, Baltimore & Ohio, Southwestern and Lehigh Valley roads; an electric transfer table to the Pittsburgh Locomotive Works; an electric overhead traveling crane to the Lincoln Foundry & Machine Co., of Pittsburgh; pile drivers to the Mobile & Birmingham Railway and Atlantic Coast Line, and wrecking car to the Chicago, Peoria & St. Louis Railroad.

The Taylor Battery Company, manufacturers and designers of special electrical apparatus, have removed from 51 Dey street to 79 Cortlandt street, New York City, where they have combined their shop and office.

The Consolidated Car Heating Company of Albany reports sales of 1,103 street car heater equipments from August 1 to December 1. The West End Co., Boston; Peoples Traction Co., Philadelphia; Nassau Railway Co., Brooklyn; Union Railway Co., Providence, and the Buffalo Railway Co., have recently ordered over 700 car equipments.

Leon F. Blanchard, of Newark, N. J., was last week appointed Receiver of the Standard Nut Lock Co., of Newark, in a suit brought by W. W. Blanchard, one of the stockholders of the company.

The Facer Hammered Solid Steel Car & Locomotive Wheel Co., is applying for incorporation in Ontario to manufacture steel wheels. The capital stock is $150,000, and A. T. Wilson, of Perth, Ont., is one of the chief projectors.

We learn that there is an excellent prospect of a speedy adjustment of the affairs of Queen & Co., of Philadelphia, who made an assignment a few months ago. Meanwhile, their large stock has been kept up and orders are being filled as usual.

Iron and Steel.

The Aschman Steel Casting Co.'s works, at Sharon, Pa., in the Shenango Valley, has been levied on for the $10,000 advanced by Stockholders E. A. Wheeler and J. J. Spearman to tide the company over a financial embarrassment several months ago. This plant was built in 1891 and has an annual capacity of 2,000 net tons.

New Stations and Shops.

The plans for the new station of the Staten Island Rapid Transit road at St. George, S. I., referred to a few weeks ago, are now being revised by the architects, Baldwin & Pennington, of Baltimore. The bids for the new station are likely to be called for during the month.

The foundations are being put in for the Union Railroad and ferry station in San Francisco at the foot of Market street. The ground and buildings will be owned by the city, but will form the terminal of the Southern Pacific and the ferries crossing the bay to Oakland and other points.

A large part of the extensive docks of the Northern Pacific Railroad at Tacoma, Wash., being on artificial ground, slid into the bay a few weeks ago, leaving water 60 ft. deep where the wharves had been. Two lives were lost and a safe containing a large amount of money was submerged with one of the buildings. Some of the structures which were not destroyed will be moved further inland, and new wharves will be constructed with very long piling, though it is said that no attempt will be made to rebuild on the former insecure foundation. The loss to the company by the slide was about $10,000, exclusive of merchandise which was submerged, but was partially saved.

The Yale & Towne Mfg. Co. Transfers Its Crane Business.

An important change, which will undoubtedly be of much consequence to others, besides the firms more particularly interested, was made on Dec. 1, when the Yale & Towne Manufacturing Co., of Stamford, Conn., transferred the entire business of its crane department to the Brown Hoisting & Conveying Machine Co., of Cleveland, O. The latter company has an extensive business in the manufacture of tramways, hoists, derricks, dumping buckets and other machinery used in loading and unloading vessels, cars and similar work. This transfer includes the patents and drawings and thebuilding of traveling, locomotive, jib, pillar and other cranes heretofore made by the Yale & Towne Co. and crane work of all kinds. The Yale & Towne Co. retains its long established business in chain pulley blocks, Weston's differential blocks, triplex spur gear blocks, screw blocks and double lift hoists. The change is made by that firm to give it better opportunity to develop its line of builders' hardware, which has long been the chief product of the company.

The building of cranes was undertaken by the Yale & Towne Co. about 18 years ago. Mr. Henry R. Towne, of that firm, concluded that the handiness and economy of cranes was not appreciated in this country as much as it deserved to be. The Yale & Towne Co., then as now important manufacturers of pulley blocks and of hand hoisting machinery, naturally added the building of cranes as a development of their business. At that time practically all cranes built were of five tons capacity or less, none were built of over 10 tons capacity, and nearly all were operated by hand, a few being designed for operation by power. This business developed rapidly both as to the number and size of cranes built, and the shops were enlarged in 1881 and again in 1883. The increasing demand kept the crane manufacturing department generally busy and the increased facilities frequently overtaxed; but the other manufacturers had taken up the business and have been active competitors, so that the relative rate of increase has not been as great since 1883 as in the earlier ten years. The demand for cranes became chiefly for those of large dimensions and great lifting capacity, particularly traveling cranes and steam locomotive cranes, calling for the use of large amounts of heavy structural material. Here the question of transportation came to be an important factor. Most of the heavy material came from Pittsburg and other western points, and the chief market for these heavy cranes is west of the Alleghenies. The location at Stamford, Conn., therefore, was a particularly inconvenient one, and the question of a new site for the works was taken up. After investigation it was decided that Cleveland, Pittsburg or some point in that vicinity, would be the most favorable location, and negotiations toward transferring the crane business to one of these points were begun. Before this question was settled the company came into communication with the Brown Hoisting & Conveying Machine Co., of Cleveland, which already had extensive works at Cleveland well suited to crane building, and already engaged in work of a similar nature. A proposition was then made by the Brown Company to purchase the crane business of the Yale & Towne Mfg. Co., which was finally accepted.

Interlocking.

The National Switch & Signal Co., has completed an interlocking plant of 14 levers for the Lake Superior Terminal & Transfer Railway Co., at West Superior, Wis.

Another Big Dredger for Liverpool.

In times past we have described the great dredger, the Brancker, which has been for some time in constant service widening and deepening the channel of the Port of Liverpool. The Docks Board has now decided to order another of the same type to be built by the Naval Construction & Armaments Co. The new dredger will be of 3,000 tons and more powerful than the Brancker, which has already moved about 4¾ million tons of material and got a low water depth of 23 ft. over the bar with a width of 1,600 ft. With the present depth of water, dredgers of this class are more economical than the smaller ones and as with an increasing depth the rate of dredging is much slower it has been thought wise to provide a second big dredger. It is hoped that within 12 months after this one gets to work a minimum depth of 26 ft. and a width of about 2,000 ft. will be attained.

Orders for Cranes at the Industrial Works.

Among the recent orders taken by the Industrial Works of Bay City, Mich., may be mentioned an electric crane for Henry R. Worthington; a second overhead traveling crane for the Lincoln Foundry & Machine Co., Pittsburgh; transfer crane for the Wheeling & Lake Erie Railway, and turntable for the Manistique Railway in Michigan. The United States Government has also contracted with this company for a locomotive steam crane of large capacity for the Washington Navy Yard. A crane of similar type and intended for the heaviest service, is being built for Booth & Flinn, Lim., of Pittsburgh. A large order for wrecking cranes has been awarded by the Boston & Albany Railroad. This consists of three very heavy and powerful self-propelling steam cranes which will form a complete equipment for the line. A similar crane is now being built for the Norfolk & Western. Orders have been received for two electric overhead traveling cranes for the Beaver Tin Plate Co., New Lisbon, O., two electric jib cranes of 30 tons capacity, one locomotive crane for the National Pipe & Foundry Co., Scottsdale, Pa., also a 30-ton pillar crane for the Michigan Central, a steam crane of 35 tons capacity for the Southern Pacific.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

On the 5th the letter ballot in the matter of the Western Society of Engineers leaving the Association of Engineering Societies was canvassed, with the result that there was a decided majority against leaving the Association. We believe that this is a fortunate outcome of the enterprise. It is in the line of economy of human energy, and, what is probably still more important, it promotes that coherence and harmony of action which was the primary object of those who established the Association. Now, if the Western Society is dissatisfied with the conduct of the *Journal* it has the opportunity to improve it in any way that can be shown to be likely to bring about an improvement. Furthermore, if that society is dissatisfied with the American Society of Civil Engineers and is still anxious to establish a new, great, truly American society, the Association is the best possible ground to start from. A strong, energetic, harmonious and ambitious society can impress itself upon the Association, and, if a new national society is needed, can become the center of that new society, when its fitness for leadership is proved.

Tickets for passage over the railroad on the New York and Brooklyn bridge, up to July 1st last, were sold, a single one for three cents, and in packets of ten for twenty-five cents. After that date, for the convenience of those who cared to pay at one time for a single round trip, two tickets were sold for five cents; at the same rate per ticket, it will be noticed, that the packets of ten are sold. The effect of this simple change in the form of tickets sold, upon the receipts of the railroad, appears from the following analysis and is of interest to railroad managers. During the four months, July, August, September and October, in each of the years 1892, 1893 and 1894, nearly an equal number of passengers were carried, namely, 13,722,401, 13,154,096 and 13,433,149 respectively. Of these, in the two earlier years, very nearly fifty per cent. bought single tickets for three cents each, and fifty per cent. bought tickets in packets of ten, or for two and one-half cents each, the average fare per passenger being two and three-quarters cents. In the current year, 13.6 per cent. bought single tickets, 56.7 per cent. in packets of two, and 29.7 per cent. purchased tickets in packets of ten; that is, 13.6 per cent. passed over for three cents each, and 86.4 per cent. for two and one-half cents each; the average fare per passenger being nearly two and nine-sixteenths cents, or three-sixteenths cents less than before the new form of ticket was introduced. Assuming that the same number of passengers would have been carried if this change had not been made, the consequent reduction in receipts, during one-third of a year (a precise calculation being made) was $24,806.59; and if thrice that number of passengers were carried during the whole year, it would be $4,419.77, or nearly 7.2 per cent. of the total receipts from the railroad. To determine the loss of revenue from this change, to the reduction of receipts should be applied the difference in cost for additional ticket sellers, if any, required during the busy hours, morning and evening, when the traffic is greatly concentrated and dense crowds frequently throng the passageways. Of the passengers, he who now purchases two tickets at one time, and had previously purchased single tickets, approaches the ticket box but one-half as often as before, and he who had purchased ten tickets at one time, approaches the ticket office five times as often as before; the result based upon the data above, is that 18.6 per cent. less sales than before have to be made. A minor expenditure also should be added; the cost of providing a third form of ticket and of regarding it in the accounts of sales. The whole is a notable instance of the effect upon the revenue of a railroad of a change in the form of tickets sold, without a change in the rate.

The "Pooling" Law.

At last the lower house of Congress has passed a bill making it possible, under certain restrictions, for railroad companies to enter into the form of contract or agreement which we may for brevity call a pool. This is the Patterson bill. It is said that it will be seriously fought in the Senate, and we shall not predict its fate there. Of the eight sections of the bill only one, the first, relates directly to pooling and that may be summarized very briefly.

It is unlawful for competing carriers to enter into any contract or agreement for the division of their traffic or of their earnings unless the agreement is in writing and filed with the Interstate Commerce Commissioners; then it becomes lawful and enforceable at law at the expiration of 20 days after filing it unless the Commission specifically disapproves. It is the duty of the Commission to issue an order disapproving if it finds that the contract would result in unreasonable rates, unjust discrimination, inferior service to the public or would otherwise contravene any provisions of the Interstate Commerce Act.

The Commission may make an order disapproving a contract which has been made and requiring it to be terminated at a date fixed, which shall not be less than 30 days from the issue of the order. The effect of this order will be to render the contract unlawful and non-enforceable after the date so fixed; but the order and findings of the Commission disapproving of such a contract shall be subject to review by any United States Circuit Court sitting in equity in a judicial district in which any party to the contract has its principal office, upon petition filed by any party. The court shall determine the matter speedily, determing whether the contract shall be lawful and enforceable notwithstanding the disapproval of the Commission. Appeal may be taken within 30 days to the Supreme Court of the United States and shall be advanced for hearing, as appeals in which the United States are a party, provided that the contract shall remain unlawful and non-enforceable during the proceedings in the United States Court.

Great hopes are being built up in the stock market on the probability of the passage of a pooling clause. It has become an article of faith with a large part of the public of the United States that the only hope of the railroads of the country is legalized pooling. Undoubtedly, there is a good basis for this widespread belief.

It is not necessary for us to point out the fact that the unrestricted competition that has existed since the spring of 1887 is ruining the railroads; nor is it necessary for us to emphasize the fact that the secret cutting and discrimination which are going on all of the time, in spite of the provisions of the Interstate Commerce law, are working great injury, not to the railroads alone, but to honest merchants everywhere. It has become a commonplace in railroad economics that stable rates are more to be desired than low rates. No man who pretends to have any sense in the discussion of railroad rate problems now denies this proposition.

The idea has grown tremendously within the last two or three years, and particularly within the last year, that the railroads must be allowed to protect themselves against each other, and that the law is now powerless to do so. Indeed we believe that any law that could be passed would be powerless. We say any law that could be passed. It is conceivable that the penalties of rate cutting and discrimination, in all their multitudinous forms, could be made so severe that no man who has sufficient respectability to be employed in the traffic department of a railroad would venture on such offenses. But, it is not conceivable that laws so severe could be enacted. Of course, it is not desirable that they should be. If, then, the law cannot protect those railroads which wish to live honorably (and they are in the great majority) it would seem to be logical that they should be allowed to protect themselves. No way of doing this has yet been suggested which seems to have any chance of success, except by permitting the roads to enter into agreements—call them pools if you will—which agreements shall be legal, and under which the party who breaks the agreement can be brought into court and made to suffer in money damages. Such agreements have existed for years in England, and have worked well.

It is often said that a legalized pool or traffic agreement, or whatever it may be called, is not the ultimate step; that back of it all must be good faith and honorable conduct among railroad officers in their relations with each other. This is very true. But we conceive that the first step toward giving the honest men a chance, and putting the rogues at disadvantage, is a law under which the honest men can get the rogues into court. In fact, so strangely perverted has the notion of right and wrong become in railroad traffic affairs that some such law seems to be necessary to make a good many of the rogues suspect that they are rogues. In the absence of strict legal definitions they seem to think that they are simply "smart;" that they are "hustlers"; or when they get a little higher up in rank, "able traffic men." A little law and an occasional heavy fine in court would clear up the moral perceptions of these men wonderfully.

We need not stop now to consider the argument which is still made, even in Congress, that if the railroads are permitted to enter into pools, they will put up rates unreasonably. The day when that argument can have weight with serious and well-informed men is long ago passed, and anything that we might say would, we fear, have little influence with those Senators who still look upon a railroad as a rapacious public enemy.

The Nicaragua Canal.

Up to this time we have declined to discuss the question whether or not the United States as a nation should assume any financial responsibility for the construction of the Nicaragua Canal. The broad question is debatable, and it involves such great and complicated interests, and is in the end so largely a matter of judgment, and so little a matter of fact, that we have not cared to entangle ourselves in that part of the discussion. Therefore we have confined our writing on the subject to showing that the estimates of the cost of the canal which have been put forward by the company, and which form the basis of that company's efforts to get aid from the United States, are probably absurdly low; that the works proposed are probably quite inadequate for the safety of the structure itself and for the transit of the traffic on which the estimates of revenue are made; that the information which has been made public is not enough to enable one to make a safe estimate either as to the adequacy and stability of the works or as to their probable cost; and, finally, that probably sufficient information is not available in any one place to enable one to draw safe conclusions. All of this was set forth at considerable length in our issue of Jan. 13, 1893, to which the reader who has access to a file of the *Railroad Gazette*, and who is really interested in the subject, should turn. Still further argument on the matter has been published by us in later issues, but the chief part of what we have to say on the matter is summed up there.

At that time we urged upon Congress that the nation should not be committed to such an immense responsibility on the very inadequate information which had been made public, and upon entirely *ex parte* statements, and we suggested that the first step to take before any further legisiation was had was for the President to send a competent commission to Nicaragua, to study the matter on the ground, and to make further examination of the records, and then to report upon the probable cost and the probable adequacy of the undertaking before the Government should be committed to its financial support. We have reason to suppose that what was said at that time had some influence in preventing a great national mistake. At any rate, the bill of 1893 did not pass.

In January, 1894, another bill was introduced guaranteeing $70,000,000 of bonds and providing for a commission such as has been indicated above, which should report to the President before any of the bonds were issued. That bill is now up. But why did not the canal company and its friends get a bill pushed through in the session of 1893 authorizing the commission without attempting anything further? That would have been the candid course to take, and would have disarmed any opposition. Such a bill could have been put through immediately after the failure of the other bill, and the report of the commission would now be available; and if it had been favorable the affairs of the Nicaragua Canal Company, so far as the action of the United States Government affects them, would have been advanced two or three years.

The bill which is now before the Senate is that of January, 1894, and all consideration of it must be based upon the old, fallacious and inadequate estimates of cost which have been before the country for some years. Senator Morgan says that Mr.

Menocal estimates the entire cost of the canal at $65,084,176; that a special board of experts appointed by the Maritime Canal Company fixed the figures at $87,799,570, and that owing to the lessened cost of machinery, labor and living, the outside cost of building the canal now would not exceed $70,000,000.

We shall not enter here into any detailed disscusion of these estimates, but we warn the reader that they are mere assertions, and that there are a great many competent and disinterested judges who believe thoroughly that the cost is immensely underrated. Within a year one engineer has told us of an estimate of the cost of the canal, which we have mentioned before in another connection. A certain great contractor, one of the foremost of the world, was asked to enter into negotiations with a view to taking the contract for building the Nicaragua Canal. Before doing so he sent his own engineers to look into the work on the ground, and they reported that it would probably cost $400,000,000. This was not the estimate of an enemy of the canal, nor of any partisan of the Southern Pacific Railroad, but of a man who made his living by taking contracts of just that class, and who was very much interested in having such a big contract negotiated.

Another engineer, who is very familiar with all the work that has been done in the way of surveys, estimates and actual work of construction, says that "the material on the Great Divide as shown by the borings is almost exactly the same as in the great Culebra cut, which more than anything else wrecked the prospects of success at Panama. It is a volcanic trachyte and porphyry interspersed with thin beds of talc and soapstone and different colored clays. These beds are tilted, and I believe the whole side will slide in when the cut reaches the bottom. The divide cut must be avoided if there is any possibility of doing it." This, it will be remembered, is a colossal excavation, almost three miles long, with a maximum depth of 330 ft. As for the foundation of the great Ochoa dam, he says "the bottom consists of gravel and sand and boulders or loose rock, and the wings or ends of red clay hills filled with boulders. There is no solid rock there." These are two of several very important criticisms that he makes. This engineer, too, is not an enemy of the Nicaragua Canal, but is very much interested in the project.

The figure of 87-and-odd millions arrived at by the engineers who were called in by the company to examine its plans and estimates, was, it is very likely, a fair one *from the data given*. It is probable that those engineers assumed the adequacy of the data as given to them, and explicitly put upon the canal company the responsibility for those data, for they probably did not undertake to guarantee the facts. When Sir John Fowler and Sir Benjamin Baker were asked to study the Hudson River tunnel and to express an opinion as to its feasibility as an engineering project, they did so, and confined themselves strictly to that. They did not enter into the commercial and financial aspects of the project, nor did they undertake to express any opinion as to whether the money to finish the enterprise was in sight, or as to whether it could, if finished, earn fixed charges. On their statement that, as an engineering work, the tunnel could be built, a good deal of English money was put into that unfortunate enterprise, and now some of the investors think that they have been tricked. Perhaps they were, but not by Sir John Fowler or Sir Benjamin Baker. It was their business before investing to find out exactly the limitations of the report made by those gentlemen as engineers. So in this Nicaragua Canal matter. The $87,000,000 estimate should be taken strictly within its limitations and for what it is worth.

In the present bill the interests of the nation seem to be protected, in that a commission of three engineers must report upon the project before the bonds are issued by the United States Government; but it would be a good deal better that that report should be made before any bill is passed pledging the Government credit. If the bill passes in its present shape Congress will put a tremendous responsibility out of its own hands and into those of the President and three engineers. The engineers may be wise or foolish, and the President may be wise or foolish, but the step will have been taken. If the engineers make a favorable report "the President shall direct that all proper steps shall be immediately taken to carry into effect the provisions of this act." That is, they pledge the credit of the country to an enterprise the cost of which may run up into hundreds of millions. Why not stop where we are, and count the cost first? There is not the slightest danger of our losing the control of the canal. Congress may be very sure that the markets of London and Europe have been thoroughly well canvassed long before this.

The Manchester Ship Canal.

The present situation of the Manchester Ship Canal enterprise, its cost, the possibility of paying fixed charges and the burden imposed by it on the tax payers of Manchester, is a matter of considerable importance to a good many citizens of the United States. That great work is often held up as a magnificent example of judicious enterprise in making a seaport of an interior city, and the promoters of similar, but less costly schemes, on this side of the Atlantic, like to dazzle the unwary with the picture of the great engineering work done, of the courage and enterprise of the people who furnished the money, and of the inevitable results in reduced rates for the manufacturing region of Southeastern Lancashire. They are apt, however, to ignore the dark side of the picture. Two or three times in the last six months we have given some glimpses of this side, but it is well that it should not be forgotten. A remarkably, compact and clear story of the enterprise and of its present situation is given in the last number of the *Yale Review*, written by Mr. Edward Porritt, and in what follows we shall draw somewhat freely upon that paper without giving further credit.

The enterprise is not of recent origin. In 1712 when Liverpool had but 10,000 inhabitants, and only four or five years after the first dock was constructed, a scheme was devised for making the Mersey navigable to Manchester for what were then vessels of large size. As this went on other schemes were brought forward, but the railroad era discouraged most of them, and it was not until 1877 that the great project for the present canal was brought forward. Four lines of railroad connected the two cities and besides this there were two canals. One of these was the Bridgewater Undertaking, which the present canal company has absorbed and operates. The other was an old canal, built in 1720, which has now been abandoned, but which, up to the building of the ship canal was an important part of the Mersey and Irwell Navigation. But notwithstanding the existence of these means of transportation, the people of Manchester and that region felt that they were unduly oppressed by the existing carriers and threw themselves into the ship canal project with great enthusiasm.

Of course the railroads and the Liverpool interests fought the Manchester Canal bitterly in all its steps, and this contest, both in the fighting of it and in the compromises made, added a great deal to the cost of the completed canal; and yet the railroad companies, the Liverpool Corporation, the Liverpool Dock Board and the Bridgewater trustees did what they as guardians of the interests confided to their care were bound to do; that is, to oppose to the last an enterprise which was certain to reduce their revenues, and to make the best bargain they could when they were obliged to make a bargain. But with the people of Manchester the ship canal was an article of faith. An energetic and well organized propaganda was carried on which reached the poorest as well as the richest people, and it is not surprising that the resistance made by the railroads and other interests should have left behind it a bitter feeling which is intensified now by the fact that the stockholders will probably never get any dividends.

The ordinary capital, amounting to £6,000,000, was divided into shares of £10 each, and the terms of payment were made easy, to enlist the working classes and the smallest shopkeepers. The canvass of these people was systematic and thorough, and we have been told by good authorities that there are at least 50,000 holders of these shares. A sign of the interest taken by the working people in the enterprise, which seemed in the light of what was sure to be its fate, almost pathetic, was observed in a visit to the Manchester docks nine months ago. Groups and almost crowds of workingmen with their wives and children, were walking about on quays and along the banks of the canal, and going up and down on the little excursion steamers, apparently full of the feeling that that was their property, and that they were helping to lift the burden off the trade and industry of Manchester.

The capital of the undertaking is:

Common stock	£6,000,000
Preference stock	2,000,000
Debentures	2,000,000
Manchester loan	5,000,000
Total	£15,000,000

All this has been spent and there are still heavy items of "deferred work" to be provided for before the scheme is completed. Leaving out entirely the £8,000,000 of stock, the fixed charges are placed at £410,000 a year. Of this £80,000 is interest on the 4 per cent. debentures secured by the Bridgewater Undertaking, and £225,000 is payable to the Manchester Corporation as interest on its loans. The balance of £105,000 is the estimated cost of maintaining and working. The returns from the Bridgewater Canal may be taken as £40,000 a year, leaving £370,000 to be earned by the Manchester Ship Canal; but the returns for the first nine months of operation give the total earnings as £62,494, say £83,000 a year. The deficit on this showing is about £287,000 annually. But a distinguished engineer living in Manchester and very familiar with the whole matter, has told us that he estimates the charges and maintenance at £200,000 a year—about twice the figures given above. At any rate the interest on the Manchester city bonds will have to be met by the tax payers of that corporation, and Sir John Harwood, who was chairman of the municipal delegation in the Board of Directors of the Ship Canal Company, and who resigned last June, has said that the citizens of Manchester will have to pay a canal rate of at least 1s and 8d to the pound on the ratal value of all the property in the city limits; that is, they will have to bear a tax burden of 8 per cent. to support what has now become a municipal enterprise. But, as we have said above, good judges say that the cost of maintenance is put too low, for a great amount of dredging will have to be done every year, and the expenditures caused by the wash of the banks will be heavy.

There can be no doubt that the enterprise has already been profitable to a good many people, for it has lowered the rates at which cotton, chemicals and other materials for the mill owners can be brought in. Many of these people have already got handsome returns from the money that they invested in the canal; but the poor people who put their £10 and their £20 of savings into the shares can never hope to get anything except indirectly through the increased prosperity of the manufacturing interests. Whether or not they will think that they have made a good bargain is yet to be seen. The great mass of the tax payers of the corporation of Manchester may think also that they get in indirect benefits and adequate return for the great burden of tax which their experiment in municipal partnership in engineering enterprises has imposed upon them; it may be that the increasing efforts that are now being made to build up a profitable trade through the canal will succeed some time. But the present generation of shareholders will probably have passed away before that is accomplished, and the burden on the Manchester tax payers will be heavy for years. To us the whole case looks like a terrible warning with which our great cities and the country at large should be familiar.

Some Papers on Steam Engines, Before the American Society of Mechanical Engineers.

Regarding the value of steel jackets there is evidently even now, after many experiments, much uncertainty among those whom we would naturally expect to know definitely about the proper location and amount of steam jacking to get the best efficiency. The latest evidence of this apparent condition is the concluding paragraph in a paper describing tests of a triple engine read before the recent meeting of the American Society of Mechanical Engineers, by Prof. C. H. Peabody and E. F. Miller. The paragraph reads:

"Two remarakble and to us unexpected conclusions, appear to come from our tests on jacketing. 1. That there is comparatively little effect from jacketing the heads of the cylinders of our engines. 2. That the gain from jacketing is less for very short cut-offs than for a cut-off at 30 per cent. on the high-pressure cylinder, at which our engine finds its minimum consumption."

This subject is of sufficient importance to make it worth while for the American Society of Mechanical Engineers to appoint a committee to see what can be done toward raising money enough to undertake a series of tests that will outline at least the limits to which steam jacketing can be carried with economy.

Mr. F. W. Dean, in two papers on engine trials, gave some comparisons that are striking, and show that the maximum efficiency is only attained by exercising great care and skill in the design and operation of a modern steam engine plant. The papers give tests of two engines, both compound condensing, which give an efficiency below 13 lbs. of dry steam per indicated horse-power per hour, the most efficient using but 12.2 and at the same time it has less expansion, runs slower and has a smaller cylinder ratio. The table gives these facts:

	Leavitt.	Rockwood.
Steam pressure, absolute	151.60 lbs.	175.50 lbs.
Vacuum	27.75 ins.	25.3 ins.
Ratio of expansion	20.40	33.00
Number of revolutions per minute	18.57	76.4
Length of stroke	10 feet.	4 feet.
Piston speed per minute	371.5 feet.	611.2 feet.
Cylinder ratio	4 to 1	7 to 1
Drop between cylinders	None.	About 14 lbs.
Dry steam per I. H. P. per hour	12 156 lbs.	12.84 lbs.
Difference in favor of Leavitt	0.684 lbs. = 5.3%	

The Leavitt engine is a compound condensing vertical cylinder beam pumping engine, the steam between the cylinders is re-heated by live steam from the boiler. Both high and low-pressure cylinders have steam jackets on the heads and sides, which are filled with steam at boiler pressure.

The Rockwood engine is a horizontal cross compound with a high pressure cylinder jacketed all over and the low-pressure with jacket on the heads only. There is a re-heater between the cylinders. Mr. Dean says about this engine and its condition: In the writer's judgment the jackets were badly piped and it is doubtful if the jacket circulation was good. The re-heater was quite deficient in heating surface. The condenser was of the injector type, made by the builder of the engine. The vacuum was defective, although very cold water was used. Regarding the results, it is said, it will be seen that these results show a very economical use of the steam and far less than has heretofore been thought possible with compound engines. If the vacuum had been 28 inches the steam consumption might have been as low as 12.48 lbs. The indicator cards have a grave defect in showing a considerable drop in pressure between the high and low pressure cylinders. This drop was desired by the designer, but the loss in effect of the steam which arises from this cannot be recovered by any subsequent event. Although the performance of this engine is remarkably good Mr. Dean believes that it was realized in spite of great defects and that it would have been much better if these alleged defects had not existed. The economy is due to high steam pressure with a resultant high degree of expansion, small clearances and tight pistons and valves.

About the Leavitt engine it is said: "This engine is, both in design and results in striking contrast with the Rockwood system engine. The comparison in the table shows very clearly that the ratio of 7 to 1 does not necessarily produce as economical results as a ratio far removed from it, even with the additional advantages of 24 lbs. more steam pressure, 1.6 times as many expansions, 4 times as many reciprocations per minute, and twice as great piston speed. It tends to show that no advantage arises from a drop in pressure between the cylinders, if evidence were needed of this.

"It is the writer's opinion that in order to use steam in the most economical manner in a multiple expansion engine, the expansion must be continuous throughout the series of cylinders (that is to say, there should be no drop between the cylinders), and that compression should be carried up to the initial pressure in each cylinder. These features have been employed to the fullest extent in the Leavitt engine, which forms the subject of this paper, and the result has surpassed all records of economy of engines of its class."

These facts, and such we believe them to be, about compound engines, are important to those who are designing power stations for electric roads. Here is a case where a compound engine is more economical than most triple engines have been claimed to be, and apparently there is no reason for using a triple engine to get high efficiency if the compound is properly designed and operated.

Mr. Charles T. Porter has a paper on the comparison of the action of a fixed cut-off and throttling regulation with that of the automatic variable cut-off, on compound and triple expansion engines. This paper takes up the differences between throttling regulation and automatic cut-off in a way that is useful to those who are too much impressed with the importance of an automatic cut-off. In general, regarding this subject, Mr. Porter says:

"When the variable cut-off is employed on engines working under large changes of resistance, then, whether the engine be simple or compound or triple expansion, just in the degree that the variable feature comes into action does the cut-off run to more wasteful point of the stroke, and often, indeed continually, to points which are exceedingly wasteful.

"It has appeared to me that an opening presented itself for a large improvement in the direction of economy by employing a fixed point of cut-off, suitably selected, and regulating by means of a throttling governor thus avoiding early cut-off entirely. There can, I think, be no doubt, that, although the theoretical gain by cutting off earlier is considerable, this is outweighed many times over by the increase in the losses from cylinder condensation and waste room."

Not long since a young railroad mechanical engineer reached three conclusions after reading one of the papers before the American Society of Mechanical Engineers, and each conclusion was wrong. Now it was not the fault of the writer of the paper nor of the data from which the conclusions were drawn; it was merely a natural result of drawing general conclusions from limited data. One conclusion was that the most economical cut-off for a single expansion engine, hence a locomotive, was 25 per cent. Second, that it was more economical to run a simple engine, hence a locomotive, with the throttle wide open under any circumstances than to regulate the power with the throttle. Third, the most economical way to run a locomotive is to have a fixed cut-off at 25 per cent. of the stroke and raise the steam pressure up and down to suit the power required. Of course it would be impossible to run a locomotive in this way, and that disposes of the third conclusion. Perhaps the papers this year before the American Society of Mechanical Engineers show more clearly than any set of papers before this how delicate is the balance of conditions in a steam engine when they are such as to give the maximum efficiency. They show that general conclusions about the conditions that give maximum efficiency are unsafe as a rule, and are only practical to follow when they are drawn with a full consideration of the multitude of practical things which affect economy.

Taking the paper of Mr. Porter, and some other papers presented before this on the efficiency of throttle governing and automatic cut-off engines when the power required is small and much less than the normal rating of the engine, it is easy to see why it is that wire-drawing steam through a locomotive throttle may, when there is a light load, give much better efficiency than with a very short cut-off and an open throttle. Probably, owing to the complications of condition under which locomotives operate and the wide variation in speed and power required, the only way to determine the most economical cut-off is by experiment. This cut-off is longer in cold weather than in warm, and such evidence as has been gathered goes to show that it is probably more efficient to wire-draw the steam through the throttle than to use a shorter cut-off than 20 per cent. under any conditions. Regarding the raising and lowering the boiler pressure, all of the reliable data that has been gathered indicates that at least, up to 200 lbs., it is more economical to run a locomotive by wire-drawing the steam through the throttle than to use a lower pressure.

Railroad Matters in Congress.

The Patterson bill (H. R. 7273), the proposed amendment to the Interstate Commerce law, to permit pooling by the railroads and to make other changes, was discussed in the Lower House of Congress last week and on Tuesday of this week it was passed by a vote of 166 to 110. It now goes to the Senate, where it is said there may be strenuous opposition to the pooling clause in the interest of some railroads which object to the inclusion of a clause specifically giving the commission power to inquire into all business of any road which is a party to a pool. The principal provisions of the Patterson bill as to pooling are given in another article in this issue; but the bill has seven sections besides that referring to pooling, as follows:

Section 2 provides that tariffs filed with the Commission shall be preserved as public records and shall be prima facie evidence before the courts; the same provision applies to pooling contracts, etc., and to the statistics, tables and figures in the annual reports of railroads made to the commission. Extracts from any of the documents named, when certified by the secretary of the Commission, shall also have the same standing.

Section 3 makes it a misdemeanor to give or get reduced rates by false weighing, false billing, etc., or to *seek* such an advantage; penalty, $5,000 or less (imprisonment penalty abolished). This section also makes the railroad company guilty of a misdemeanor for a discrimination or for any violation of the Interstate Commerce Law; penalty, $5,000 or less. The act, omission or failure of an agent, although unauthorized or forbidden, shall nevertheless be deemed, prima facie, the act, omission or failure of the road.

Section 4 provides for a stenographic record of testimony taken before the commission.

Section 5 amends Section 16 of the Interstate Commerce law, the object being to facilitate proceedings before the courts; pleadings, testimony, etc., before the Commission shall be receivable in evidence and constitute the record in the case on which the court shall proceed, unless it deem it necessary to take additional evidence, in which case the court shall re-commit the matter to the commission.

Section 6 adds a new section to the law, providing for the re-hearing by the commission of matters upon which it has issued a decision, but no application for re-hearing shall excuse a road from complying with the order already issued. If the commission suspends one of its own orders, which has been approved by a court, the suspension also suspends the decree of the court.

Section 7 strengthens the provision requiring annual reports from the railroads. They must be filed by Sept. 15, under a penalty of $25 a day for delay.

Section 8 provides that cases under the Interstate Commerce Law, now pending in court, shall not be affected by the present bill.

Several other bills on railroad topics have been presented in Congress. Mr. McEttrick, of Massachusetts, introduced a bill requiring frogs and switches to be blocked on all railroads in the Territories. Mr. Draper, of the same State, presented a bill which makes it unlawful for any common carrier to haul any car not equipped with automatic couplers or any passenger coach not fitted with such couplers or any locomotive which has no driving wheel brakes. The author of this bill evidently thinks that the present law on this subject reforms the world too slowly. The House Pacific Railroads Committee will present to the House a resolution asking the Committee on Rules to report a special order fixing the time for consideration of the committee's bill reported at the last session, which provides for an adjustment of the indebtedness of the Pacific railroads to the Government. The bill requires the Union and Central Pacific companies to extinguish their first mortgages from the moneys in the sinking fund and from their private purses, and extends the indebtedness to the Government for 50 years, the companies to pay interest at three per cent. annually, the Government to foreclose its indebtedness in case of failure on the part of the company promptly to meet its obligations. The House Committee on Labor is preparing a bill to provide for arbitration in case of strikes, based partly on the recommendations of Mr. Carroll D. Wright. Men from Cincinnati and Louisville have been in Washington urging an appropriation for a fast mail train from Cincinnati southward.

Gages for Sheet Metal, Tubes and Wire.

The Committee appointed by the Master Mechanics' Association to submit, at the next meeting, a method of ordering sheet metal, tubing and wire by the decimal system, for the adoption of the Association, has sent out an intelligent circular which is so arranged as to permit replies to be made without delay and which offers for criticism a logical set of thicknesses for a standard. It has for its basis, not an arbitrary set of dimensions selected at hap-hazard, but a series of definite dimensions in one-thousandths of an inch, which increase by an increment that can be remembered. No set of standards has been more discussed than the different wire plate gages, unless it be the old standards for nuts and bolts prior to the adoption of the American standards.

As shown by a carefully prepared article by Mr. Oberlin Smith in the *Iron Age*, there are now in existence more than 20 different standards of dimensions for gage numbers, varying from No. 0000000 to No. 50, which is quite reason enough for throwing aside all numbers and adhering to dimensions alone. It is just as easy to give the thickness as to give the number of the gage. Existing gages have the smallest numbers for the larger sizes and the large numbers represent small sizes; there is neither method, logic nor convenience in the existing system. What is wanted is a definite thickness of material and it is only an annoyance to be compelled to remember the thickness represented by a gage number, or to refer to books to learn sizes. It often happens that one is away from a reference library and it is risky to trust to one's memory in important work. Many users of plate have long since given up gages and order entirely by the dimension required.

To manufacturers the only advantage of gages is that it divides the thicknesses definitely and does not leave room for small variations. And this is just as well accomplished by using numbers which represent the thickness as by using numbers which represent nothing at all, unless one happens to remember their arbitrary values; for instance, 2, 4, 6, 8, 10, etc., can just as well represent hundredths or thousandths of an inch in thickness as to represent gage numbers. And in this way there is just as much saving in time in arranging orders for material and in dividing the material into definite sizes to be kept in stock, and it will equally well eliminate odd dimensions.

It required a lot of talk to get rid of a vast number of sizes of bolts and nuts, but now when one knows the diameter of the bolt all of the other important dimensions are known without referring to a table, with the exception of the number of threads to the inch, which, as it should be, is changed as little as possible and is therefore the same for several different sizes. Sometime in the future the thickness of sheets and other regular metal products will be ordered by numbers that will mean something definite, and it is to be hoped that whatever system is adopted the numbers on the gages will indicate to any one who is conversant with mechanical measures a definite thickness or dimension in decimal parts of our standard inch.

A series of very entertaining paper have been published recently in *Transport* (London) under the title of "A Traveler's Tale." Extracts from these have been printed in a previous issue. The papers are anonymous, but the author's style gives him away (to use what he would call an Americanism) as Mr. Acworth. In the last paper of the series he makes some observations on state railroad working as affecting the passenger. Theoretically, the passenger being part proprietor of the railroad, the men of the staff are his servants, whom he and other citizens employ to carry out the arrangements which the voters have determined upon. Practically, the spirit seems to be that the passengers are the servants of the railroads. For instance, in the matter of civility the English station and train staff are far above the Germans. The Englishman is ready to lend a hand to the humblest passenger, which the German apparently never does. In England a woman can bring her husband or her brother to see her into the train; in Germany he must pay two cents for a platform ticket before he can pass the gates. In England porters are usualy tipped, but do not protest if they are not; in Germany they demand tips as a right, having a scale of charges of two cents or four cents for eacharticle. In England an ordinary amount of luggage passes free in practice, whatever the nominal limit; and moreover there is a formal regulation among the companies that where the excess charge is less than 12 cents or 25 cents (as the case may be), it is waived. In Germany if your ticket entitles you to 56 lbs. of baggage free and your bag weighs say 57 lbs., you are charged for 22 lbs. excess, while the baggage master is far from taking the least trouble to make combinations by which you and your friends can pool your allowances of baggage. In fact, in case of doubt in Germany the decision is made by the regulations and by the official against the passenger. In Germany a season ticket holder cannot move without his ticket, bearing his photograph, it being taken for granted that he will swindle if he can; and while the second part of an English return ticket if not used may be redeemed at its full cost, in Germany it is simply so much cardboard. In Hungary the express trains used to carry third-class passengers; but when in consequence of the zone system the express trains grew too heavy, the third-class passengers were turned out of them and sentenced by the government, which exists to promote the greatest happiness of the greatest number, to travel at about 18 miles an hour. In Prussia, where corridor trains, on which meals are served, have lately been introduced widely, every passenger is required to pay on those trains an excess fare of two shillings for first or second class, and in rare instances where third-class passengers are carried, anc sexes of one shilling. Even the German public rebelled at this and lately a notice has been published to the effect that the excess charge will soon be reduced to one-half in case of passengers traveling a distance of not more than 150 kilometers. These are a few facts which are presented as an offset to a good deal of abstract theory.

The loop situation in Chicago remains unsettled.

There has been a hitch in the matter, owing to the objection of property owners on Wabash avenue, which is the principal street through which it is proposed to run the loop. The other streets are of comparatively minor importance and the claimed benefit to property on those streets is easier to understand. The Wabash Avenue Property Owners' Protective Association was formed over a year ago and represents considerable more than a majority of the frontage on the part of the street through which the proposed loop has been laid out. At a meeting last week it was resolved that the elevated line on Wabash avenue should be strenuously opposed. All this shows how conflicting are the statements that have been made by the representatives of several railroad companies. It has been said on several occasions that the majority of consents had been secured. The roads now claim that the opposition is headed by those who want to make the railroads pay liberally for permission to go through Wabash avenue. It is contended by the opposing interests that it is impossible to serve four elevated roads on a two-track loop, but those who say this are probably not aware that the headway between trains would be one minute, for a two-minute interval on the main line, and that this interval has been shown to be practical in New York City on the Manhattan lines. It has been proposed to have two of the roads reach the loop over bridges, but nothing has been said about the long approach that will be necessary to gain the height of about 18 feet that will be necessary between the surface of one track and the surface of the other. There has been some legislation in Illinois against grade crossings, and it is probable that there would be some opposition to any plan of elevated roads where four roads would run on a two-minute interval each, over grade crossings. Although it is promised that the final plans and agreements will be signed at once, yet it is evident that there must be a good deal more thinking done before the roads will commence to buy steel for a loop structure.

The latest move made by the down-trodden merchants of Chicago to secure justice from the railroads is reported in a special despatch to the St. Louis *Republic*. It is a meeting of commission merchants of South Water street who, although they have a serious grievance, appear to have been too modest to present it through the Chicago papers. The freight officers of all the roads entering Chicago were to be present at the meeting, but whether they all accepted the invitation we have not heard. The object of the meeting was to protest against the rates granted to shippers west of the Mississippi, from which territory New York buyers can, it is claimed, get fresh produce cheaper than they can from New York. Through refrigerator cars are run from these points to the East with such celerity and cheapness that the discrimination amounts, they say, to 12 cents per 100 lbs. What is wanted is that "the through refrigerator cars be stopped at Chicago and reshipments made from there." That's it, exactly! In every city the merchants say that a toll gate should be established at *our* city. Probably the present claim will be fortified with arguments showing that the quality of oleomargarine will be improved by taking the barrels out of the car and giving them a brief sun bath at Chicago. Although at first sight this demand may seem a trifle "cheeky," it is to be remembered that it is exactly in line with previous demands from the same city. The grain dealers there have long complained because the distance from Burlington eastward in a direct line is less than it is by way of Chicago, and they seem to think that it is contrary to nature to build a railroad by the shortest line possible. It is a great pity that the state line between Indiana and Illinois (south of Hammond)were not thicker and higher. As it is out of the question to produce mountains in that locality we cannot think of any remedy except an appropriation from Congress to build a high board fence along this line. These commission men remind us of the old depot-restaurant keepers. In former days, when passenger trains were not in such a furious hurry to get somewhere, there were lunch counters in the stations every 25 miles, more or less (and brakemen who had a suitable pull with the attendants could eat six or eight times a day). But as trains grew less wasteful of their time, and country stations were deprived of the honor of a five-minute stop, these doughnut establishments were gradually killed off, until now the smaller ones are all dead or have dwindled to one-horse affairs. In each case, however, the proprietor felt perfectly sure that he was the victim of the most outrageous injustice.

Every now and then the New York newspapers come out with the statement that there is a demand for smoking cars on the elevated railroad; but from an item recently published in the *Sun* it would seem that the comfort to be derived by smokers from such an additional accommodation may not be so great as it has been supposed to promise. A reporter who visited one of the Brooklyn roads where smoking cars are run, found that they were largely filled by objectionable, if not repulsive, passengers. On the elevated, as everywhere else, the question of caste arises in smoking cars as well as among non-smokers, and if all are to be accommodated it will be necessary to run two smoking cars, as has been done to a limited extent on long-journey trains in the Western States. Some smoking cars have recently been run on the Newark and Jersey City electric street railroad, and it is said that it has been decided to make them a permanent atures. The smoking car is run as a "trailer."

Bond Market in November.

The following table shows the changes in the quotations of railroad bonds on the New York Stock Exchange for two months. The table has reference to the editorial comments printed last week.

	Highest.	Lowest.	Last Sales.	Changes Compared with Last Sale in October.
Roads in Control of Receivers.				
Atch., Top. & S. Fe 4s	70	64¼	64¼	— 2
" " " " 2nds	21⅞	18¾	19	— ⅜
Atlantic & Pacific 1st	43½	40½	41	+ ½
Colorado Midland 1st	78	74½	75½	— ½
Colorado Midland 4s	25½	20	20	— 4
St. Louis & San F. gen. 6s	103	95	102½	+ 7½
" " " " 5s	87	85	85½	+ 1½
" " " " con. 4s	45	39	45	+ 7
" " " " 2nd "A"	113	112	113	+ 1
" " " " 2nd "B"	113½	112	113⅛	+ 1⅞
" " " " 2nd "C"	113½	112	113⅛	+ 2⅜
East. Tenn con. 5s	105	103½	104½	+ ½
Erie 1sts, cons. gold	134¾	133	133	— ½
" 2nds	77	70¼	70¼	— ¼
Chic. & Erie 1sts	95	93	94⅛	— 1⅛
" " incomes	28	26	26	— 4
L., Evans & St. Louis 5s	41	35	35	—10
Northern Pacific 1sts	116	114⅛	115¾	+ 1¾
" " 2nds	89¾	88	88½	+ ¾
" " 3rds	63	59⅛	60½	+ ¾
" " con. 5s	30½	26⅝	28	+ 1
" " col tr notes	79¼	75½	78½	+ 2½
" " Mon. 1sts	35½	31	35	+ 4½
Chic. & Nor. Pac. 5s	42	39½	40	+ ¾
Wisconsin Central 1st	58	54½	54½	— ¾
" " incomes	9⅞	8½	9⅞	+ 1⅛
Duluth & Man., 1st Dak. div.	83	81	83	+ 3
Reading gen. 4s	79½	75½	76½	— 2¼
" 1st incomes	32	28	29¼	— 1½
" 2nd incomes	22½	18½	19	— 2¼
" 3d incomes	17⅜	14	14¼	— 2
Rich. & Danville 1sts	120½	120	120	+ ½
" con 5s	93	87	93	+ 5
Savannah & West. 1st	56½	50	55	+ 3½
Union Pacific sink. fund 8s	99	97	98¾	+ 1¼
" " gold notes 6s	90	85½	89	+ 4
Atch., Col. & Pac. 1sts	42	40	42	+ 7
Kan. Pac. con. 6s	80	75	75⅛	— ⅛
Ore. Nav. 1st 6s	110	109½	109½	+ ⅜
Ore. Short Line & U.N. con 5s	46½	42½	46½	+ 3½
Oregon Short Line 6s	88	81⅞	88	+ 5⅞
Ft. Worth & Den. City 1sts	75⅛	71	74⅛	+ 2⅜
U. P., D. & Gulf 1sts	42¾	37½	40	+ 3
St. Joe & Grand Island 1sts	62	59	59	— 4
W. N. Y. & Penn. 1sts	104¾	103¼	104¾	+ 1¼
" " " " 2nds	25¼	24⅛	25¼	+ 1¼
Toledo A. A. & N. M. 1sts	85	80	81	— 4
Tol. A.A. & Cad. 1sts	72	71	71	— ¼
Tol., St. Louis & Kan. City 1sts	62½	59¾	60	.....
Average advance, $0.78.				
Grangers.				
Chic., Bur. & Q. con. 7s	124½	122⅞	123¾	+ 1⅛
" " " deb. 5s	100½	98½	100	+ 1½
" " " conv. 5s	103	102½	102½	— ⅛
" " " Neb. ex. 4s	89⅛	87⅛	89	+ 2
St. Paul Term. 5s	112	111	111	+ ½
" " Chic. & Mo. Riv. 5s	108¼	107	108	+ 1¼
" " Wis. & Minn. 1sts	109¾	108¾	109	.....
" " gen. 4s	91½	91	91⅛	+ ⅛
Northwest gold 7s coup	125	123½	124¼	+ 1½
" " reg	125½	122½	125½	+ 4½
" sink fund 6s	118½	117	118½	+ 1¼
Hannibal & St. Jo. con. 6s	120½	118½	120½	+ 2
Rock Island 6s	130½	129	130½	+ 2½
" Ext. 5s	104	103	103⅜	+ 1⅛
" Deb. 5s	92¾	89½	91	— ¼
Average advance, 1.26.				
Trunk Lines.				
Lake Shore 1st	120	119	119½	.....
" " 2nds	127	125⅛	127	+ 2¼
Mich. Cen. 7s	122	121	121	+ ¼
N. Y. Central 1st	127⅝	126½	127⅝	.....
" " deb. 5s	109¼	108½	109	+ 1
West Shore guar. 4s	106½	105¾	106	+ ¼
N. Y., Chic. & St. L. 4s	102¼	101⅛	101⅞	+ ⅝
Penn. 4½s	111¼	110⅛	111	+ ¼
Balt. & Ohio 5s, 1885	112¾	111¼	112½	+ ¾
Average advance, .62.				
Southwestern.				
Hous. & Tex. Cent. 4s	63¼	62	63	— ¼
Int. & Gt. Northern 1sts	117	113½	116	+ 3
" " " 2nds	72	68¼	71	+ 1½
" " " 3rds	28	25	28	+ 3
Kan. & Texas 4s	83⅝	81¼	83	+ 1½
" " 2nds	48	43⅛	46½	+ 3½
Mo., Kan. & East 1sts	84½	81	83⅜	+ 3⅜
Mo., Kan. & Tex. of Texas 5s	77½	73	76	+ 3
Missouri Pacific 3rd	109	107½	107½	+ 1
Iron Mountain 5s	80½	79½	79¾	+ ¾
Pac. R. R. of Mo. 4s	101½	100¾	101½	+ ¾
" " 2nds	108	107	107	— 1
St. Louis Southwestern 1sts	61	57	60½	+ 1½
" " 2nds	20½	17¾	18	+ ½
Texas & Pacific 1sts	90	86⅞	89⅝	+ 2⅞
" " 2nds	27⅛	24⅞	24⅞	— ⅜
Wabash 1sts	105	103¾	104¾	+ ¼
" 2nds	71¾	69	69¾	— ¼
Average advance, 1.34.				
Transcontinental.				
Den. & Rio Grande 4s	83¾	80¾	82¾	+ 2⅛
" " imp. 5s	80	76¾	80	+ 3⅛
Rio Grande West. 4s	71½	67¾	70	+ 2⅛
St. Paul. M. & M. Mon. Con. 6s	114	113	114	+ 2
" " " " " ex 4s	88½	85	88	+ 3¾
So. Pac. of Cal. con. 5s	91¼	90¼	90⅝	+ ⅛
So. Pac. of New Mex. 6s	103½	102⅜	103	+ ⅝
Average advance, 1.85.				
Coalers.				
Jer. Central gen. 5s	115⅜	113½	114½	— ⅞
" " " 5s, reg	114	112	112½	— ½
Lehigh & Wilk. con. ass'n.	109	108	108	— 1
N. Y., Ont. & West. 5s	111½	110⅝	111	— ⅝
" " pref. 4s	88	87¼	88	+ ¼
Del., Lack & West 7s	133	132½	133	+ ¼
Average decline, 0.28.				
Southern.				
Lou. & Nash. gold 4s	78¾	77	77	—
" " gen 6s	119½	118¼	119½	+ 3
Nash., Chat. & St. Louis 1st	135	133	134½	+ 1½
" " " 2nd	100	98½	100	+ ¾
South. Rail. 5s	88¾	86½	88	+ 1
Ches. & Ohio con 5s	108¼	107	107¾	+ ¾
" " gen 4½s	77⅞	75	75	— ¾
Average advance, .59.				
Miscellaneous.				
Brooklyn Elevated 1st	86	80	84½	— 4
" " 2nds	53	50	53	— 2
Chic. & East. Ill. 5s	99½	98	98¼	— ¾
Hocking Val. 5s	91½	89	91	+ 1½
" 6s	95½	93	93	— ½
Kanawha & Mich. 4s	77¾	75¾	77	+ 1½
L., N. A. & Chic. 1st	109½	107½	109½	+ 2
" " " con 6s	99⅞	94	95¾	+ 1¾
" " " gen.	69	67	68	+ 1¼
N. Y. Ele. 1st	111	109¾	110¼	— ¼
Ohio Southern 1sts	99¼	95	98	+ 3¼
" " gen	52⅜	49¾	49¾	+ 1¾
Oregon Improvement 5s	57	48	48	—10
Pitts. & Western 4s	82¾	79½	81¼	— 1¼
Third Avenue 1st	119¾	118¾	119¾	+ ¾
Union Elevated 1sts	84	79½	82½	+ 1
Western Union Col. tr. 5s	108½	107⅛	108⅛	+ 1¼
Average advance, .04.				

United States Railroad Statistics for 1894.

The Interstate Commerce Commission has sent out a synopsis of the report of the Statistician on the income and expenditure of the railroads of the United States for the year ending June 30, 1894.* Returns are reported from 570 operating companies, covering 149,559 miles of road, or about 85 per cent. of the total operated in the country. The main results from operation on the mileage reporting, that is to say, 85 per cent. of the total for the year, are as follows.

Gross earnings	$949,639,075
From passengers	309,137,142
From freight	617,958,498
Miscellaneous	22,420,298
Operating expenses	$643,428,341
Net earnings	306,210,744

Reducing these figures to a mileage basis we get the results below per mile:

		Decrease from 1893.
Passenger earnings	$2,067	$ 53
From freight	4,132	774
Total gross earnings	6,350	840
Operating expenses	4,302	574
Net earnings	2,648	266

The passengers carried were 505,285,446 and the passenger-miles 12,889,926,578; the tons carried were 571,955,942 and the ton-miles 70,426,344,965. The passengers carried per mile of line were 86,253 as compared with 83,809 in 1893, the increase doubtless having been due to the stimulation of passenger business by the World's Fair. The tons per mile of line were 470,893 against 551,232, a loss of 14.6 per cent. The average passenger-mile rate was 1.976 cents against 2.108 the year before and the ton-mile rate was 0.866 as against 0.878 in 1893. The result of diminished traffic and reduced rates is apparent in the figures below:

	1894.	1893.	Decrease.
Net earnings	$306,210,744	$350,766,607	$44,555,863
Dividends	62,464,961	66,464,130	3,999,169

All of the geographical groups except No. 6 and No. 10 show a deficit instead of a surplus after deducting dividends, the aggregate amount of deficit being $28,032,621.

THE SCRAP HEAP.

Notes.

It is reported that the Southern Pacific has reduced the salaries of a large number of employés.

At Los Angeles, Cal., on Dec. 6, four railroad men were convicted of obstructing the mail during the American Railway Union strike, and were sentenced to imprisonment for 18 months each.

The Great Northern Railroad is now using 1,500 tons of coal a month from the mines of the Fair Haven Coal Co. near Sedro, Wash. Coal from these mines is now used by the road as far east as Leavenworth, Wash.

Trainmen of the Baltimore & Ohio have been arrested at Pittsburg for burning bituminous coal in locomotives contrary to a city ordinance forbidding such use. The road will contest the validity of the law in the courts.

The F. F. V. limited train No. 2, of the Chesapeake & Ohio leaving Cincinnati at 12.01, noon, reached Washington on time 27 times during the month of November and on the other three days the delays were slight. Its record westbound was practically the same.

The roof of the large train shed of the Boston & Maine at Boston has been fitted with steam pipes for the purpose of melting the snow which accumulates upon it in winter. The pipes are laid in or near the gutters. This shed is made up of eight roofs, each about 40 ft. wide, placed side by side. It was illustrated in the *Railroad Gazette*, May 25, 1894.

W. J. McKee, Superintendent of the Missouri Pacific, at Fort Smith, Ark., and other officers of the same road, who were accused of killing a Pullman conductor, and arrested, have been discharged. The conductor was mysteriously shot in his car, in the night, and the body thrown off. The railroad officers were in a private car at the rear of the train.

H. D. Judson, Division Superintendent of the Chicago Division of the Chicago, Burlington & Quincy, has been held by a Grand Jury on a charge of criminal carelessness in connection with a fatal accident to a passedger at Riverside. The passenger, a woman, was struck by a freight train which passed the station while a suburban train was discharging passengers.

The Prosecuting Attorney of Henry County, Indiana, has filed against the Cleveland, Cincinnati, Chicago & St. Louis Railroad a complaint of 2,001 paragraphs, each of which seeks a recovery of $25 for violation of the "black-board law" by the company, in failing to maintain a black-board in its telegraph station at Kennard, in that county, and bulletining its trains thereon.

An east bound passenger train of the Texas & Pacific was robbed eight miles west of Fort Worth, Tex., on the evening of Dec. 8, about 6 o'clock. The amount of money taken was reported as very large, but the figures were exaggerated. On Monday of this week it was reported that one of the robbers had surrendered, and that the two others, with his aid, were discovered and caught.

The Lehigh Valley has ordered that all trainmen who make their headquarters at Packerton must live between Slatington and Mauch Chunk (not over 12 miles f m

* These statistics are one year later than those presented in the eighth annual report of the Commission, which is reported elsewhere in this issue.—EDITOR.

Packerton). The immediate cause of the issuing of this order is that after a collision which occurred lately the engineer told a reporter that he had been on duty so long that he was overworked and sleepy. An officer of the road states that the company must wash its hands of any responsibility for the risk where men waste time in going to and from their residences, and thus impair the efficiency of their service.

Pacific Mail Freight Traffic.

Justice Truax, of the Supreme Court, at New York City, has made permanent the temporary injunction granted several months ago in favor of the Pacific Mail Steamship Co. restraining the Panama Railroad Co. from making any agreement for its traffic in contravention of an agreement made in 1872 between the steamship company and the railroad company. The contract required the railroad company to give through bills of lading and send certain West Coast business by the steamship company. The railroad company claimed that the old agreement was at an end, and made a new contract with the Chilian Steamship Co. The case will be appealed.

Storage Facilities of New York Harbor.

The Brooklyn Wharf & Warehouse Co. is the title of a corporation which it is proposed to form to buy up and consolidate a large number of the important warehouses in Brooklyn, N. Y., on the shore of New York Bay. One of the chief promoters of the concern is Mr. Thomas A. McIntyre, owner of one of the large storehouses. It is said that the owners of 264 brick warehouses have practically agreed to come into the new company. These buildings have a floor space of 9,390,000 sq. ft. and a water front of 2¾ miles; 35 covered piers, 16 grain elevators with a storage capacity of 20,000,000 bushels, and other facilities.

Chesapeake & Delaware Canal.

The Chesapeake & Delaware Canal Commission has completed its examination of the maps and surveys submitted by Colonel Craighill, approved the report drawn up by General Casey, president of the board, and adjourned last week with a recommendation for the selection of a route. The report is now with the Secretary of War, who will forward it to Congress. Under the resolution directing the work of the commission, the Secretary has no power to act on the recommendation, but is simply instructed to report it to Congress. The commission was to decide upon the most feasible route, financial and other considerations being taken into account, and it is believed that the shorter and cheaper route, known as the Sassafras River route, was not approved by the commission. One of the lower surveys, it is understood, was thought to be the most desirable location.

New Dry Dock at South Chicago.

The Chicago Ship building Co., has just completed a dry dock at its yards at South Chicago large enough to accommodate any boat on the Great Lakes. It is 420 ft. long in the clear, 100 ft. wide at the top, and 80 ft. at the bottom. When the dock is filled the water is 18 ft. over datum line. The pumps which empty the dock are rated to handle 50,000 gallons of water a minute and are capable of emptying the dock in a little over two hours.

A New Ferryboat Launched.

The first of the three new ferryboats contracted for by the New York & Brooklyn Ferry Co., was launched at the Roach shipyard on the Delaware River, last week. Her dimensions are: Length on keel, 155 ft.; length over all, 168 ft; beam over guard, 62 ft.; depth amidship, 14 ft 6 in. The vessel is a handsome double ender, constructed of iron. She has two decks and is supplied with all the modern appliances and improvements. The Columbia and Vermont, the two sister boats, will be ready for launching in a few weeks.

Traffic On the Erie Canal.

The traffic via the Erie Canal for the season just closed shows a slight improvement in grain shipment and a large improvement in lumber and shingles, pig iron, and general merchandise as compared with last year. The shipments of grain for the season were 48,428,521 bushels, as against 48,042,715 last year. Lumber shows an increase of 5,000,000 feet. The total value of shipments by canal was $41,356,302, as against $53,474,254 in 1893. The total value of the receipts by canal was $51,901,735, as against $35,915,030 last year. The total number of boats cleared was 6,621, as against 7,255 in 1893. The average rate paid for carrying grain was the lowest on record, being 3.2 cents per bushel.

Norfolk & Western Freight Boats.

The steamer Lambert's Point, the first ship of the new Norfolk & North American Steamship Co., from Lambert's Point to Liverpool, arrived at Norfolk on Dec. 4. During the next year seven other vessels will be built for this company, to correspond generally with the Lambert's Point, which is 447 ft. long, 43 ft. wide, with a depth of 27 ft. Her registered tonnage is 2,152 net, 3,387 gross. She was built at Sunderland, England, and is a freight steamer having no accommodations for passengers. Her grain capacity is 216,000 bushels. This line was organized especially to handle the export trade of the Norfolk & Western Railroad from Lambert's Point. The company is said to have already secured for shipment this month 60,000 bales of cotton and 500,000 bushels of corn.

The Hamilton Radial Railway Project.

This company has submitted an amended offer to the City Council of Hamilton, Ont., in which it asks a bonus of $300,000, the money to be divided as follows: $100,000 for the line from Hamilton to Woodstock; $75,000 for the line to Straw Station; $50,000 for the line to Guelph, and $75,000 for the line to Berlin. The line to Woodstock will be operated by steam and the others by electricity.

New York Cable Railroads.

The President of the Third Avenue Railroad Company, which recently began operating 8 miles of road on Third avenue by cable power, replacing horse traction, has issued a circular calling a special meeting of the stockholders for Dec. 26, 1894, for the purpose of authorizing an issue of additional capital stock to the extent of $2,000,000, making the total amount $9,000,000. The stockholders will have the privilege of subscribing for the additional stock at par.

Foreclosing an Abandoned Canal.

Attorney General Poe, of Maryland, has filed a bill in the Common Pleas Court of York County, Pa., asking a decree for the sale of the Susquehanna and Tidewater Canal, from Havre-de-Grace, Md., to Wrightsville, Pa. Pending the sale proceedings a Receiver is asked for to take charge of the affairs of the companies that own the canal and to operate the canal, if the courts deem such a course desirable. The bills state that the canal companies have now defaulted on three half-yearly payments of $10,000 each, due the State of Maryland on the $1,000,000 mortgage it holds on the property; that another similar default, on Jan. 1 next, is probable; that the canal is now idle, deteriorating in value, and has no business or revenues sufficient to pay operating expenses or interest. In addition to the State of Maryland debt, the canal has outstanding obligations for over $2,000,000. In 1872 the canal was leased to the Philadelphia & Reading Railroad for 999 years, but last April the Receivers of that road surrendered the lease. Since then the canal has been idle.

Pumps for the Allegheny Water Works.

The bids for the pumps for the new water works at Allegheny, Pa., were $23,000 below the lowest estimate. The bids were as follows: Wilson, Snyder & Co, $231,990; W. Cramp & Co., $220,000; E. P. Allis & Co., for triple expansion engines, $220,000; H. R. Worthington, $197,750; Snow Pump Co., $198,000; E. P. Allis & Co., $180,000; Holly Mfg. Co., $185,785; Groshon Pump Co., of New York, the lowest bidder at $177,000.

Electric Power on the New York Canals.

It is understood that the annual report of State Engineer Adams, of New York, will contain a recommendation that electric power be used as a method of propulsion for canal boats on the State canals.

Lake Superior Iron Mines.

On the Gogebic range several idle mining companies have within the past few days announced an intention of operating next year, among them the Sunday Lake, Ashland, Iron Belt, Atlantic and Section 12. Most of these are of the smaller mines, but they will add materially to the Bessemer output for the coming year, which is likely to reach a total of not far from 9,000,000 tons.

Reports from mining companies show that the Minnesota Iron Co. easily leads in production for the year just over with a total of 1,417,000 gross tons. Next to it is the Norrie group on the Gogebic, which has sent out 826,000, nearly all from the Norrie mine itself. Then follows the Penokee and Gogebic Consolidated with 675,000 tons. Perhaps to these should be added the Lake Superior Consolidated, the Rockefeller mine on the Mesaba, as both are under the same ownership, and which was the next in point of output with 575,000 tons. Following is the Oliver, which has supplied the Carnegies and the Olivers with 505,000 tons this year. No other Lake Superior producers have reached the half million mark.

The Duluth & Iron Range road has handled 1,400,000 tons of ore from mines to docks and into vessels, on grades reaching 2½ per cent., without a fatal accident. It has loaded 598 vessels, the average cargoes being 2,296 gross tons, this being the largest average ever reached on Lake Superior. The largest cargo of the year was 3,221 gross tons. One 3,100-ton cargo was loaded in 55 minutes, the best record ever made. All the business of the year was handled in 222 days.

On several Mesaba miles elaborate preparations are being made for next year, and there will be several new giant producers there in 1895, both in the Minnesota Iron Co. and the Rockefeller syndicate. The two Minnesota ore roads expect to handle 2,000,000 tons each in 1895, and a new one, the Duluth & Winnipeg, 400,000 tons more

The St. Mary's Falls Canal Traffic.

The net registered tonnage passing through the canal at the Soo promises to approximate 12,000,000 tons for the season. This is very gratifying considering the year. The freight tonnage up to the first of this month for two years is given below:

	To Dec. 1, 1893.	To Dec. 1, 1894.
East bound freight, net tons	7,345,941	9,607,738
West bound freight, net tons	3,392,190	3,032,134
Total freight, net tons	10,738,131	12,639,872
Increase, net tons		1,901,741

This increase of 17.71 per cent. in tonnage is due to an addition of 2,261,797 tons (30 per cent.) to the eastbound traffic, and is in spite of a loss of 360,056 tons (12 per cent.) in the westbound traffic; 217,346 tons of this loss is charged to coal, while the shipments of iron ore added 2,533,658 tons to the freight movement. Without the cheaply mined ore of the Mesabe range, the traffic for 1894 would, doubtless, have been smaller than for 1893. The traffic for the two years is shown in the appended table:

	To Dec. 1, 1893.	To Dec. 1, 1894.
EAST BOUND.		
Copper, net tons	87,530	98,893
Corn, bushels	2,386,499	1,529,948
Building stone, net tons	19,426	21,417
Flour, barrels	7,291,281	8,738,123
Iron ore, net tons	4,014,556	6,544,648
Iron pig, net tons	32,766	21,068
Lumber, M. ft. B. M.	578,499	718,938
Silver ore, net tons	2,470	412
Wheat, bushels	42,290,267	34,495,882
Unclassified freight, net tons	147,722	181,690
Passengers, number	9,244	13,869
WEST BOUND.		
Coal, authracite net tons	3,008,120*	526,460
Coal, bituminous net tons		2,264,314
Flour, barrels	3,860	783
Grain, bushels	28,850	10,500
Manufactured iron net tons	56,846	36,107
Salt, barrels	225,130	237,561
Unclassfied freight, net tons	262,808	268,903
Passengers, number	9,615	13,331

*Anthracite and bituminous were not separated in 1893.

Hartford Electric Railroad.

The Hartford Railroad Co. proposes to change all the motive power on all lines to electricity. Lines now run to Wethersfield, a distance of three miles, one to Glastonbury, distance 10 miles, to East Hartford, distance of six miles, and one to Unionville, a distance of 10 miles. When completed the electric road will completely circle the city.

The Paris World's Fair of 1900.

The preparation for the World's Fair to be held in Paris in 1900 goes on in the French way; that is, without hurry and with great system. The latest news that we have is that Mr. Henri Chardon, Auditor to the Council of State, has been appointed Secretary General.

The Nebraska Freight Rate Law.

Four years ago last June the Legislature of Nebraska passed a law to limit the freight charges of railway companies. After a pretty careful consideration of the Act Gov. Boyd vetoed it. It was a daring thing to do, for the overshadowing issue in State politics has long been the railroad question, and primarily the Union Pacific. Public sentiment, especially in the Governor's party, ran very high, and to act in the interest of the railway companies and against that of the farmers was little short of political suicide. Furthermore, the Governor resorted to no technicalities or evasions in his destruction of the Act of the Legislature; he based his veto on the ground that the bill was unfair to the railroad companies, that it was an act of spoliation aimed at the men who had put their money into the railroads of the State, and that Iowa had a short time before tried a similar law and it had reacted most injuriously upon its business interests. The decision may have cost the Governor his office; his title was then in dispute, not on the ground that he had not received votes enough, but on the ground that he had not complied with the naturalization laws; he was unseated amid great applause from the Populists, the farmers and the anti-railway people generally.

A year ago last April the Legislature of Nebraska again passed a maximum freight bill, and it became a law. The railroads fought it on the ground that it was ruinous to them, and Justice Brewer has declared it invalid, because its rates were unreasonable and unjust. It is worth while to recall at this point that Circuit Judge Caldwell rendered a decision in April last, in the case involving the right of the receivers of the Union Pacific, to reduce wages, that the court would take judicial notice of the fact that the cost of the railroad was far less than the amount of its capitalization; "the men," said Judge Caldwell, "must be paid fair wages, though no dividends are paid on the stock and no interest on the bonds." This, of a company that was in the hands of receivers because it paid neither dividends nor interest, and of course had no revenue out of which to pay wages except what it earned, which had not been enough to keep it out of bankruptcy. "It is a part of the public history of the country," continued Judge Caldwell, "of which the court will take judicial notice, that for the first $36,000,000 of stock issued this company received less than two cents on the dollar. . . . There would seem to be no equity in reducing the wages of the employees below what is reasonable and just in order to pay dividends on stock and interest on bonds of this character." It will be observed that the court which had possession of the road only because the company was insolvent, was forbidding the reduction of expenses, while the state was seeking by its law to cut down its revenues.—*Journal of Commerce, New York.*

Minneapolis Flour.

The magnitude of the flour manufacturing industry of Minneapolis was illustrated on Nov. 28, when twelve trains, composed of 243 cars, carried the product of the Pillsbury-Washburn mills, in flour, bran and shorts, to the East. It was the largest shipment ever made from Minneapolis in one day. All of the work of loading and billing was accomplished between the hours of 8.30 in the morning and 6 in the evening. A true sense of how large a shipment it was can be seen in the statement that if a single train bore it away, there would be required 1¾ miles of cars, but divided into sections of 20 cars each, it made 12 trains.—*Minneapolis Tribune.*

Abolition of Grade Crossings in Buffalo.

The officers of the New York Central have finally agreed with the Buffalo Grade Crossing Commission, so far as concerns the improvements on the line of that company's tracks, and the contract has been signed. It is said that it provides for the beginning of work within two months. Considerable time will be required, however, for the preliminary condemnation proceedings. The plans now adopted provide for the depression of the tracks and the construction of bridges overhead for Seneca, Louisiana, Michigan and Chicago streets, east of the Union Depot, and at Main and Washington streets, west of the Union Depot (on the Niagara Falls line). These changes involve the depression of the tracks through the Union Station. At Main and Washington streets the depression will be about 14 ft. below the present grade.

A map showing these and other proposed changes of grade in Buffalo was published in the *Railroad Gazette* of May 6, 1892. Changes at streets other than those just named must wait for the action of other railroad companies or until the Commission compels an agreement. It is said, however, that one of the other roads has recently signified its willingness to proceed with the work under certain conditions.

"The Perfect Mileage Ticket."

This is the name of a new mileage ticket recently adopted by the New York, Chicago & St. Louis and other western roads. The long strip, containing the figures to be torn off, is made of one single piece of paper with a water mark; the letters of which fill up the whole length of the strip; and the brass cutting edge is at the inner end of the cover instead of outer end, making it more convenient for the conductor. On the upper half of the cover, or the leaf which turns up on opening the ticket, there is a measuring gage, accurately printed upon the cardboard as regards the brass cutter, so that the conductor can by the use of it, compute the number of miles to be taken off more quickly than by substracting or adding the figures on the ticket, as is done with the older forms.

Lake Shipbuilding.

There seems to be a decided revival in shipbuilding on the lakes. Work has been recommenced at the Globe shipyard at Cleveland, on the North Land, the sister ship to the North West. The only material change contemplated is in the arrangement of passenger quarters. It is hoped the launch will occur in the first part of June, at about the same date the North West was launched last year. In addition there are five other passenger boats, with an aggregate value of $1,330,000, that are either contracted for or are thought sure to be built, and 13 freight vessels of 43,850 net tons register, valued at $1,540,000. One of these, for which the Minnesota Steamship Co. is asking bids, is to be 400 ft. on the keel, 48 ft. beam, with a depth of 28 ft. It will register 6,000 tons net. There is also talk of building a fast side-wheel steamer for the Cleveland and Buffalo route, and new boats for lines on Lake Michigan.

Deep Water-Way Project to the Atlantic.

As an echo from the International Deep Waterways Convention, held in Toronto some three months ago, a meeting has been held in Chicago at which it was decided to try to have commissioners appointed by the United States and Canada, with appropriations of $50,000 from each country, to report upon deep waterways from the lakes to the Atlantic seaboard. This action is based, apparently, on the indisposition of New York to make any provision for handling the rapidly growing traffic of the lakes. It is quite possible that the majority of the commissioners appointed from this country may favor the Canadian route, as there seems an honest division of sentiment in the West as to which is the preferable route. And it seems probable that the majority of the Commission will favor the improvement of the St. Lawrence rather than the enlargement of the Erie Canal.

The New York and Long Island Bridge.

A contract has been given the Leete's Island quarries at Somers, Conn., for the granite to be used in the construc-

tion of the New York & Long Island Bridge across the East River at New York. It is estimated that about 20,000 cubic yards of granite will be used in the Long Island approach and 40,000 cubic yards in the piers. The first of the order will be ready to deliver about Feb. 1.

New York & Brooklyn Bridge Traffic.

The receipts of the New York & Brooklyn Bridge for November were $102,612, a decrease of $1,457 over the corresponding month in 1893. There were 3,736,320 passengers carried on the cable railroad during the month, a daily average of 124,544. The receipts were $7,290 for the arriageways, and $94,321 for the railroad. The expenditures were $86,397.

The Lachine Canal.

It has been decided to delay starting in on the work of deepening the Lachine Canal until spring. Messrs. McNamee and Mann have the contract for the work from the Dominion Government.

The New Montreal Station.

The Canadian Pacific has decided not to go on with the construction of their new East End station at Montreal this winter.

Big Four Hospitals.

Fifty surgeons in the employ of the Cleveland, Cincinnati, Chicago & St. Louis road met at Indianapolis Dec. 5 and perfected an organization to establish hospitals for the company's employees. The hospitals are to be maintained by monthly assessments of the employees. A revenue of about $40,000 yearly will be raised, and if this amount does not cover the expenses the railroad company will make up the deficiency. It is proposed to erect three hospitals, the largest to be in Indianapolis. The sites for the other two have not yet been decided upon.

The John Scott Medal.

The Franklin Institute has recommended the award of the John Scott Legacy Medal and Premium to Peter William Willans, of Thames Ditton, Surrey, England, for his improvements in steam engines. Any objection to the above award should be communicated within three months to the Secretary of the Franklin Institute, Philadelphia.

Handling Frozen Ore.

Iron ore shipments from the Lake Superior ports were continued last week, and there were not less than 30,000 tons sent out from Marquette, Two Harbors, Ashland and Duluth. All the mines had been shut down some days previous, however. The loading of ore at this season of the year, when it freezes solid in the pockets, and even in the cars in which it is transported from the mines is expensive. To make it run into the vessels it is saturated with brine, which adds considerably to the weight of the cargoes, and steam is constantly blown into the piles of ore both in the cars and dock pockets. The expense of handling is greatly increased thereby.

B. & O. Freight Station at Brunswick.

On Jan. 1 the Baltimore & Ohio will establish a transfer station at Brunswick, Md., about 75 miles west of Baltimore, for westbound freight, and abandon that department at the Locust Point station in Baltimore, where freight from places east of Baltimore has heretofore been consolidated into through carloads. About 150 workmen will be affected by the change. When the tunnel in Baltimore shall have been completed, and the ferry abandoned, the Locust Point station will be out of the way.

Consolidation of Storage Battery Interests.

The Electric Storage Battery Co., of Philadelphia, has acquired all the rights and patents of the Consolidated Electric Storage Co., the battery patents and rights of the Brush Electric Co., of Cleveland, the battery patents and all interest in connection with batteries and the good will of that branch of the business of the General Electric Co., all the property and patents of the General Eectric Launch Co., and the Electric Launch & Navigation Co., and the rights and patents of the Accumulator Co. These purchases virtually place in control of the Electric Storage Co., the entire business of the manufactures of storage batteries.

Proposal for a Railroad Library in Chicago.

A committee was appointed at the November meeting of the Western Railway Club to coöperate with the engineering societies of Chicago in presenting to the trustees of the John Crerar Library a request that the trustees take up the department of Science rather than Americana. Mr. Crerar laid the foundation of this fortune in the railroad supply business and he was a personal friend of many of Chicago's railroad officers. Therefore it is thought that it would be very appropriate should a portion of his bequest be so used as to benefit railroad men. The Western Railway Club and the engineering societies have asked the trustees to devote the library to the department of Science; and it is the desire of those interested in the advancement of the interests of railroad men, that a part be devoted to establishing a railroad library, and, perhaps, secure a hall in which the Western Railway Club and engineering societies in Chicago could hold their meetings. The construction of the library building is just beginning, and whether it will be devoted to Science or Americana, is not yet decided.

The committee appointed to advance the interests of the Western Railway Club, as above outlined, is composed of William Forsyth, Willard A. Smith and D. L. Barnes.

CAR BUILDING.

The Ryan & McDonald Construction Co. is building 50 freight cars at Curtis Bay, South Baltimore, for the Mineral Railroad & Terminal Co., of Monterey, Mexico.

The Atlantic Coast Line is soon to give out a contract for 250 freight cars, and it is expected that the entire number will very probably be awarded to the South Baltimore Car Works.

The Pennsylvania is considering the building of quite a number of freight cars, and whenever it is decided to undertake the work, part of the cars will be awarded to private firms. As yet nothing definite has been done by the company.

The award of the contract for 750 box cars and 450 coal cars for the New York & New England Railroad, which was to have been decided in New York on Friday of last week, has been indefinitely postponed, and awaits the action of the Reorganization Committee.

The Wason Mfg. Co., of Springfield, Mass., has received an order for building seven passenger cars for Brazil. The Carlisle Mfg. Co., of Carlisle, Pa., has an order for about 10 freight cars for the same company. Both of these orders were placed through the firm of Flint & Co., New York City, South American commission agents, the same firm which placed the order with the Brooks' Locomotive Works for locomotives for Brazil.

LOCOMOTIVE BUILDING.

Five new Class R freight locomotives have been turned out of the Pennsylvania's Altoona shops and put in service on the Middle Division.

The contract for the two switching locomotives for the New York & Brooklyn Bridge Cable Railroad were last week let to H. K. Porter & Co., of Pittsburg, Pa. Five bids were received: From the Rogers Works for $6,617 for each engine; from the Baldwin Works for $5,250, with delivery in 40 to 50 days; from the Dickson Mfg. Co., for $5,740; from the Brooks Works, for $6,350 for each engine, with delivery in 45 to 60 days, and from H. K. Porter & Co., for $4,746.

Seven locomotives are now owned by the bridge railroad, being used at the terminals for switching four-car trains on tracks, with curves of 100 ft. radius. During certain hours of the night when the cable is stopped, these locomotives haul two-car trains over the bridge. Six of the locomotives now used are of the four-wheeled tank switching type, weighing 22 tons each. The cylinders are 12 x 16 in. There are four driving wheels, 38 in. in diameter, the wheel base being 6 ft. The working steam pressure is 150 lbs. These locomotives do not at all times develop sufficient power to start and pull four-car trains and occasionally the drivers slip. In consequence of the long wheel base, they grind the rails and flanges in the curves and unduly pound the tracks at full speed. Therefore it was decided to substitute a locomotive of another type with a shorter wheel base with from one-third to one-quarter more hauling power. This seventh locomotive was illustrated in the *Railroad Gazette*, March 16, 1894. The bidders for the new engines were asked to submit proposals for building locomotives similar to that type. This engine has a total weight of 68,000 lbs., 80 per cent. being on the drivers. It has a wheel base of 5 ft., with cylinders 14 in. x 18 in. There are four driving wheels, 42 in. in diameter, with a pair of supporting wheels at the front, and another pair at the rear. The working steam pressure is 160 lbs. A saddle tank on the top of the boiler holds 750 gallons, but it was suggested that this capacity, in the new engines, should be increased to 1,000 gallons.

BRIDGE BUILDING.

Baltimore, Md.—The County Board last week opened proposals for the construction of a drawbridge across Bear Creek, Twelfth District. The specifications call for an iron draw span and two fixed iron spans, or a wooden pile bridge instead of the two fixed spans. The bidders were as follows: Wrought Iron Bridge Co., iron, $15,250; wooden, $12,250. King Bridge Co., iron, $19,700; wooden, $16,275. J. M. Douglass & Co., iron, $14,975; wooden, $10,808.16. Groton Bridge & Mfg. Co., iron, $16,850; wooden, $12,955. Penn Bridge Co., iron, first plan, $17,120; second plan, $16,800; wooden, first plan, $16,660; second plan, $12,960. Horsehead Bridge Co., of New York, iron, $17,870. Toledo Bridge Co., iron, $17,850; Nelson & Buchanan, iron, $17,226; wooden, $14,299. Campbell, Zell & Co., iron, $13,700; wooden, $9,800. New Jersey Steel & Iron Co., iron, first plan, $16,043; second plan, $19,789; wooden, $16,485. Detroit Bridge & Iron Works, iron, first plan $17,830; second plan, $18,218; wooden, first plan, $12,787; second plan, $13,051. Youngstown Bridge Co., iron, $12,992, $12,494 $15,749 and $12,980; wooden, $10,780 and $13,750. The contract was not awarded.

The County Commissioners have determined to have erected a substantial bridge across Bear Creek, in the twelfth district. The plan is to build the bridge of iron in three spans, one draw and two fixed spans.

Cincinnati, O.—Under a decision by the Supreme Court, just rendered, the way seems now to open for the construction of the Main street bridge at Cincinnati. Last winter the Legislature passed a law requiring the County Commissioners to build the bridge, but the Board declined to erect it. Then the question of whether the law ordered the Commissioners to build the structure or merely gave them permission was raised. The Supreme Court was divided, but the majority find that the law is mandatory and orders the Commissioners to build the bridge.

Cleveland, Lorain & Wheeling.—This company, which has contracted for replacing 70 bridges on its line with iron structures, is now using three of the new bridges over Wheeling Creek on the lower end of the line, and work has begun on three more. All the bridges will be replaced by spring.

Denver, Col.—The Board of Public Works has decided to build a new bridge on Broadway across Cherry Creek, if the Denver Consolidated Tramway Co. will agree to pay its share of the cost. Aulls & Hand, of Denver, have been engaged to make drawings, specifications and estimates of the proposed bridge.

The Osborn Co., of Cleveland, has been given the contract to test the material for the Thirty-eighth street bridge for 85 cents a ton, to be paid by the contractors.

Hamilton, Ont.—The proposed new bridge over the canal at Burlington beach is estimated to cost $30,000.

The County Council has decided that the overhead bridge which the Toronto, Hamilton & Buffalo proposes to build over the Dundas and Binkley roads shall be 14 ft. above the road, instead of 12 ft. as proposed by the company.

Lancaster, Pa.—Viewers have reported favorably upon the erection of a county bridge over Conestoga Creek, in East Earl Township.

Medecine Hat, N. W. T.—Surveys are being made here by a Dominion Government engineer for a new traffic bridge over the Saskatchewan River.

Montreal.—The following tenders have been received for the construction of the new Notre Dame bridge in this city: The Antwerp Bridge Co., $87,174; Dominion Bridge Co., four tenders, $69,297, $65,968, $59,480 and $52,828; Emery & Lafoulame, $34,644. The Canada Bridge Co.'s tender was returned, as the rules regarding the form of tender had not been observed.

New Orleans, La.—Senator Blanchard, of Louisiana, has introduced in the United States Senate a bill to amend the act authorizing the construction of a bridge across the Mississippi River, above the city of New Orleans. The object of the amendment is to extend the time for the commencement of construction of the bridge and the time for completion. This is the bridge of which Mr. E. L. Corthell is engineer and in which the Southern Pacific is largely interested.

Ottawa, Ont.—Application is being made to the Dominion Parliament for a charter to construct a low level bridge for railroad and highway purposes over the Ottawa River in the vicinity of Descheuse Rapids to a point opposite on the Quebec side of the river with a clear span of 100 ft. over the water channel and clear headway of 12 ft. above high water.

A resolution has been proposed to introduce at the next meeting of the County Council for raising $10,000 for the construction of a new iron bridge across the Rideau River to replace the wooden structure known as "Hurdman's Bridge."

Philadelphia, Pa.—The officers of the Pennsylvania Railroad have applied to the Board of Port Wardens for permission to begin work on their proposed bridge across the Delaware River in the northern part of Philadelphia. Some particulars of the bridge have previously been published in these columns. It is to have a draw of 330 ft. with three through spans of 540 ft. each. The bridge will be the only one across the Delaware River below Trenton. The approval of the Secretary of War to the plans prepared by the engineers of the Pennsylvania Railroad were secured some time ago, so that the construction of the structure can begin at once. A short elevated railroad will be built on the Pennsylvania side from near Frankfort Junction to connect with the western approach of the bridge, and the right of way for this branch has been secured for a good part of its length.

Piedmont, W. Va.—The stone work of the abutments and piers of the new bridge over the Potomac River, connecting this city with the town of Luke, Maryland, has been completed, and the false work is in place. The erection of the superstructure began Saturday last, and bad weather not interfering, will be completed January 1.

Pittsburg, Pa.—The committee on free bridges has approved the contract for the Soho street bridge which was awarded to the Schultz Bridge & Iron Co. for $399,750. The Committee on Public Works has approved the resolutions authorizing the Glenwood Highway Bridge Co. to erect a bridge approach on Second avenue, Glenwood, to connect with the proposed bridge between Glenwood and Street's Run.

A stock company has been organized to construct a suspension highway bridge across the Ohio River between Lower Allegheny and McKee's rocks, at a cost of upwards of $1,000,000. Edeburn & Cooper are the surveyors.

A committee has been appointed to push the scheme for a free county bridge across the Ohio at Sewickley.

Reading, Pa.—The Pennsylvania has placed an order with Cofrode & Saylor, incorporated, for a four-span pin-connected truss bridge of iron, to be used on its West Pennsylvania branch over the Conemaugh River. Other large orders have been received by the bridge works from the West Side Connecting, a branch of the Central of New Jersey; also the Boston, Concord & Montreal Railroad, and other railroad companies.

Riverton, Pa.—The Supervisors of Lower Allen Township, Cumberland County, have agreed to erect an overhead iron bridge, with a 70-ft. span and 30-ft. roadway over the Reading tracks at Rossmoyne street, Riverton. Proposals will be invited shortly.

Sewickley, Penn.—A highway bridge is to be built over the Ohio River between Sewickley and Coraopolis, Pa. The plan proposed is to organize a joint stock company in which Allegheny County shall be a shareholder.

Scranton, Pa.—In Select Council, Dec. 6, these bids for the building of the new Linden street bridge were opened and referred to the proper committee: Edgmoor Bridge Works, for plank flooring, $55,200; for asphalt or concrete flooring, $72,000; Canton Wrought Iron Bridge Co., $79,000 and $56,300; Chicago Bridge & Iron Co., asphalt, $79,500; wood, $56,000: Horsehead Iron & Steel Bridge Co., concrete, $82,350; wood, $61,975; Rochester Bridge & Iron Works, asphalt, $97,908; wood, $71,148. Pennsylvania Steel Co., asphalt, $79,000; concrete, $78,000; plank floor, $58,200; Cleveland, O., Iron Works, $81,981; plank, $61,600; Phœnix Bridge Co., asphalt, $75,000; plank, $57,600; Pottsville Bridge Co., asphalt, $89,988; plank, $70,575; Canton Bridge Co., asphalt, $83,473; plank, $60,771; Passaic Rolling Mill, Paterson, N. J, asphalt, $71,619; plank, $71,113; Owego Bridge Co., asphalt, $84,900; plank, $66,000; Boston Bridge Co., asphalt, $97,802 plank, $72,408; Nelson & Buchanan, Chambersburg, Pa., asphalt, $112,796; plank, $83,000; Penn Bridge Co., Beaver Falls, asphalt, $74,500; plank, $55,400; New York Steel & Iron Co., asphalt, $88,700; plank, $63,200; Union Bridge Co., asphalt, $84,400; plank, $64,500; Youngstown Bridge Co., asphalt, $92,000; plank, $68,000; Union Bridge Co., Athens, Pa., asphalt, $84,400; plank, $64,500; Columbus Bridge Co., asphalt, $99,300; plank, $77,053; Massillon Bridge Co., asphalt, $84,515; plank, $62,150; New Jersey Steel & Iron Co., asphalt, $88,000; plank, $65,200; Groton Bridge & Mfg. Co., asphalt, $74,528; plank, $56,794; King Bridge Co., asphalt, $88,500; plank, $64,700 Columbus (O.) Bridge Co., asphalt, $99,300; plank, $70,000; Shiffler (Pa.) Iron Works, asphalt, $89,500; plank; $59,990.; Toledo Iron Works, asphalt, $83,450; plank, $62,320.

Toledo, O.—The City Clerk has been directed to advertise for bids for the construction of a lift bridge over Swan Creek at Perry street, on the old site.

Tyrone, Pa.—The Keystone Bridge Co., Pittsburgh, has begun work on an iron bridge, 70 ft. long and 40 ft. wide, to span Bald Eagle Creek at 11th street. R. E. Gearhart, of Clearfield, is superintending the work.

Warren, Pa.—The Pleasant Bridge Co., has engaged W. Hildebrand, of New York City, to make an examination of its river structure prior to the putting in of steel towers.

Watsontown, Pa.—Citizens of this section last week filed a petition with the County Commissioners, asking them to act in conjunction with the Commissioners of Union County in the rebuilding of the old bridge at Allenwood, swept away by the flood of May 21, 1894, and since abandoned by the owners.

Wheeling, W. Va.—A committee of the County Commissioners of Ohio County, met with a similar committee of Marshall County last week and decided to build a steel highway bridge, not to cost over $5,000, over Big Wheeling Creek, where it forms the dividing line between the two counties.. Bids will be asked in December.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston, Revere Beach & Lynn, $2 per share, payable Jan. 1.

Chicago & Eastern Illinois, quarterly, 1½ per cent. on the preferred stock, payable Jan. 2.

Columbus, Hocking Valley & Toledo, semi-annual, 2½ per cent. on the preferred stock, payable Jan. 2.

Manhattan Elevated, quarterly, 1½ per cent., payable Jan. 2.

Mexican Northern, quarterly, 1 per cent., payable Dec. 28.

New York & Harlem, 4 per cent., payable Jan. 2.

Pennsylvania & Northwestern, semi-annual, 2 per cent., payable Jan. 10.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 2.
Maine Central, annual, Portland, Me., Dec. 19.
Wheeling & Lake Erie, special, Toledo, O., Dec. 22.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October, at 10 a. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station, on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Boston & Albany, $2 per share, payable Dec. 31.
Boston & Lowell, 3½ per cent., payable Jan. 1.
Chicago & Northwestern, 1¾ per cent. on the preferred stock and 2½ per cent. on the common stock, payable Jan. 3.
Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent., payable Jan. 1.
Columbus, Hocking Valley & Toledo, semi-annual, 2½ per cent. on the preferred stock, payable Jan. 2.
Pennsylvania & Northwestern, semi-annual, 2 per cent., payable Jan. 10.
Atlantic & Pacific, annual, Boston, Mass., Dec. 13.
Cleveland & Pittsburgh, annual, Cleveland, O., Jan. 2.
Maine Central, annual, Portland, Me., Dec. 19.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Foundrymen's Association* meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

The *Western Foundrymen's Association* meets in room 701, Western Union Building, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2:30 p. m., from October to May inclusive, at their Association Rooms in Lincoln Hall, Ithaca, N. Y.

December Meeting of Western Railway Club.

The December meeting of the Western Railway Club will be held at the Field Columbian Museum, Jackson Park, Chicago. The invitation was presented to the Club at the request of Mr. Skiff, Director, and the members of the Club are invited to inspect especially the transportation division of the Museum. A convenient and large meeting hall is also offered for the use of the Club.

Fifty-seven names were added to the list of members of the Western Railway Club at its last meeting, held on Nov. 20.

Railroad Club of Chicago.

A number of local passenger and freight agents, and other men in the traffic departments of Chicago railroads, have formed a club under the above name and have secured temporary rooms in the Great Northern Hotel. The objects of the club are mainly social, the rooms being in a central location where many of the members can readily meet at luncheon. The officers of the club are: President, H. C. Tucker, Philadelphia & Reading; Vice-Presidents, B. E. Hand, Michigan Central; L. W. Campbell, Great Northern, and L. Briggs, New York, Chicago & St. Louis; Secretary, F. S. Mordaunt, Rio Grande Western; Treasurer, W. F. Schmidt, Chicago, Milwaukee & St. Paul.

Engineering Association of the South.

The annual meeting of the Association was held at Nashville, Tenn., on Nov. 8. Mr. W. H. Schuerman, Dean of the Faculty of Engineering, Vanderbilt University, Nashville, Tenn., and Mr. W. K. Gibson, Engineer Dayton Coal & Iron Co., Dayton, Tenn., were elected to membership. An invitation from the Secretary of the Associated Engineering Societies to become a member of the same was received and referred to the Board of Directors. The President, Mr. Charles Hermany, of Louisville, Ky., delivered his annual address.

The committee to canvass the ballot for officers reported the following elected: President, Prof. W. L. Dudley; Vice-President, W. F. Foster; Secretary, W. B. Ross; Treasurer, W. M. Leftwich; Directors from Tennessee, John Biddle, W. T. Magruder, E. C. Lewis; Director from Georgia, A. V. Gude; Director from Kentucky, C. O. Bradord.

Association of Engineers of Virginia.

At the regular fall meeting of the Association held in Roanoke, Va., Nov. 17, 1894, with the President, Mr. C. S. Churchill in the chair. A paper was read by Mr. M. E. Yeatman on "The Best Arrangement of Longitudinal Braces for Timber Trestles." Diagrams were used to illustrate and a mathematical analysis was made showing how the braces should vary with the different heights of the structure.

A paper, "Notes on Steel," was read by Mr. H. A. Gillis, of the Roanoke Machine Works, giving the different processes of manufacture both now and in earlier days, and showing the different qualities due to the presence in different quantities of carbon, manganese, silver, sulphur, phosphorous, etc., in its composition. Great interest was added to the paper by the exhibition of numerous specimens with accounts of their behavior under test. Many of those present showed great interest and the discussion was quite general.

The Southern and Southwestern Railway Club.

The next meeting of the Southern and Southwestern Railway Club will take place at the Kimball House, Atlanta, Ga., on Thursday, Jan. 17, at 10 o'clock a. m. The subjects for discussion will be: (1) Cause of uneven wear of driving wheel tires, running in the Southwestern Territory. Messrs. W. Rutherford, P. H. Schrieber, W. H. Hudson, special committee. (2) Most economical method of obtaining compressed air for general use in railroad shops, and its application. Messrs. E. M. Roberts, T. W. Gentry, John S. Cook, special committee. (3) Discussion of the report on counterbalancing of driving wheels. (4) Additional report of committee on draft sheets and discussion of the subject. (5) Most economical tonnage spring. The elliptic, half-elliptic, or the coil, considering the first cost, and the duration of efficiency of each, and its effect on the rolling stock and track. Messrs. R. P. C. Sanderson, George W. Morris, S. A. Charpiot, special committee.

The following committee has been appointed on Revision of M. C. B. Rules: Chairman, R. D. Wade, S. M. P. Southern Railway, Washington, D. C.; R. P. C. Sanderson, A. G. Steinbrenner, Pulaski Leeds, James Cullen, J. M. Holt, and the Secretary of the Club.

Civil Egineers' Society of St Paul.

A regular meeting of the Civil Engineers' Society of St. Paul was held on Dec. 3, 12 members and 3 visitors present; Vice-President Estabrook in the chair. The Committee on Mr. Corthell's Prospectus for an International Institute of Engineers and Architects reported adversely and the report was adopted. The Committee on the State Survey asked for further time, which was granted. Mr. J. H. Armstrong introduced the subject of "Riparian Ownership of Lands Bordering on Lakes and Rivers" and showed the incompleteness of the United States laws touching the same. He suggested that in the case of rivers riparian rights should extend to a line midway between the meander lines instead of to the ever-changing channel. Quoting from Justice Millers' Supreme Court decision of 1890 he explained how the present law is in adequate. In the case of lakes the element of the shifting channel is eliminated and the legal center of the lake is the line midway between the meander lines, but the determination of the boundary lines of each riparian owner is a matter concerning which there may be various opinions, as was brought out in general discussion of certain riparian divisions submitted by Mr. Armstrong. Mr. C. A. Alderman stated that at Eau Claire, Wis., extensive encroachments have been made by private parties within the meander lines of the Chippewa and Eau Claire Rivers, but that the municipality has not yet taken steps to correct this, notwithstanding much agitation by individuals.

Engineering Club of Cincinnati.

The regular monthly meeting of the Club was held on Nov. 15, with 25 members and several visitors, members of the joint committee on ship canal, present. Committees were appointed to arrange for the entertainment of the Ohio Society of Surveyors and Civil Engineers on the occasion of the annual meeting to be held in Cincinnati in January next.

The subject for discussion for the evening was the proposed ship canal from the lakes to the Ohio River and for the surveys for which Congress has appropriated $20,000. Colonel Anderson opened with a general review of the subject and a statement of the objects and benefits to be derived from the construction of a ship canal, and urged action on the part of the citizens of Cincinnati to secure the route leading from Toledo to Cincinnati. Mr. Burke followed with a discussion of the feasibility of the various routes proposed, and stated that the sub-committee, of which he is a member, of the joint committee on ship canal from the various commercial bodies of the city, would recommend that the time for the report of the engineers engaged in making the surveys be extended, that the restrictions as to dimensions be removed so that the engineers might be free to make recommendations on that point, and if possible, that the appropriation for the surveys be increased to allow of more extended and elaborate surveys being made. Mr. Ruggles discussed the question from the standpoint of the effect the building of a ship canal would have on the business of the railroads with which it would compete in transportation.

Western Society of Engineers.

At the November meeting of the Society at the Grand Central Hotel, the following members and associates were elected: As members—Edward J. Blake, T. L. Condron, Chicago; P. H. Connolley, Riverside, Ill.; Howard N. Elmer, Frank W. Forbes, W. H. Finley, Frank C. Hatch, Willis B. Hayes, George T. Horton, Daniel H. Lawton, John A Moody, George P. Nichols, E. L. Ransome, E. M. Robinson and George H. Scott, all of Chicago. As associates—W. Boldenweok, Frederick Braasch, Thomas Byrne, J. S. Dunham, B. A. Eckhart, Thomas Gahan, A. P. Gilmore, John Griffiths, Lionel Jacobi, Thomas Kelly, A. McArthur, M. McDermott, Peter W. Neu, Joseph Pajeau, William H. Russell and Frank Wenter, all of Chicago.

The Secretary announced that formal notice had been given to the officers of the Association of Engineering Societies of the withrawal from that Association of the Western Society of Engineers, such withdrawal to take effect at the close of the present year. Resolutions of thanks to General Manager Chappell, of the Chicago & Alton, for the special train furnished on the occasion of the excursion of the Society to the Sanitary District Channel on Oct. 6, and other resolutions thanking Messrs. Griffiths and McDermott, the contractors for the section visited on that day, were passed. Details were given of an excursion to the industrial works of South Chicago on Oct. 17. A committee of five was elected to nominate officers of the Society for the ensuing year.

The paper read was by Mr. E. F. Osborn on "Refrigeration by Carbon Di-Oxide," which gave an account of the mechanical features of artificial registration by the use of this gas, the apparatus and fittings being shown by lantern slides.

The discussion on the paper by Mr. Goldmark on "Strains and Deflections of Solid Bridge Floors," read at a previous meeting of the Society, was postponed until the December meeting on the 5th inst.

Engineers' Club of St. Louis.

A meeting of the club was held on Nov. 21, with 25 members and eight visitors present. It was ordered that a committee of three be selected by ballot to make nominations for officers for 1895, reporting at the next meeting. Messrs. C. M. Woodward, J. B. Johnson and Robert Moore were chosen.

Prof. C. M. Woodward read an address on "The Relation of Technical to Liberal Education." The paper first defined at some length the terms "Technical" and "Liberal" as used in this discussion. The work of the civil engineer, the mechanical engineer, the electrical engineer, the architect and the chemical engineer was clearly pointed out. The prominent features of a liberal education, both as it formerly existed and as it is now modified by the system of electives, was pointed out. The importance of the many new elements in education was explained. The best technical and liberal trainings nowadays cover much the same ground. The professor paid a tribute to the dignity of the engineer, and defined the true relation of technical to liberal education, as "liberty, fraternity and equality."

Prof. H. A. Wheeler reported the results of a recent visit to Cincinnati, where he had gone to examine the Simanoin desiccation process for the reduction of garbage. He explained the system in detail and compared it with the Merz system from which it differed principally in that the desiccation and oil extraction were carried on in the same tank, instead of in separate vessels. He considered the process inferior to the Merz, both in its practical operation as shown in Cincinnati and in the principles underlying its use.

A typographical error occurred in the Secretary's proceedings of the meeting of Nov. 7, and was not detected when republished. The price paid by the City of St. Louis to the St. Louis Sanitary Co., for the reduction of garbage, is 9 cents per 100 lbs., instead of per lb., and no payments made for quantities above 100 tons instead of 200 ton is, as stated.

PERSONAL.

—Mr. Michael J. Healison, Auditor of the Chicago Great Western Railroad Company, for the last six years has resigned on account of ill health.

—General Freight Agent, Frank E. Smith, of the Lehigh & Hudson road in New York, has resigned to accept the position of General Passenger and Freight Agent of the Wilkes-barre & Western road.

—Mr. Herbert A. Young, of the City of Mexico, formerly Division Superintendent of the Mexican Central Railroad, died on Dec. 9, at Toledo, where he was visiting when he was taken sick. He was 37 years old.

—Mr. M. F. Bonzano, who was for seven years Division and General Superintendent of the Philadelphia & Reading, has been made Assistant Manager of the South Jersey Railroad Co., with headquarters at Cape May, N. J. He will have charge of the operating department of the South Jersey.

—Mr. E. W. Clark, of Philadelphia, was elected President of the Lehigh Coal & Navigation Co. this week. He was a former President. President Harris, of the Philadelphia & Reading has been acting as President of the Navigation Co. since the death of Mr. Leisenring, of that company.

—Mr. G. Clinton Gardner, who has been General Manager of the Ohio River Railroad in West Virginia for the last year and a half, has resigned that position. Mr. Gardner was on the Western New York & Pennsylvania Railroad and its predecessor, the Buffalo, New York & Philadelphia Railroad, as President for a number of years.

—Mr J. M. King has resigned as Superintendent of the Philadelphia, Reading & New England Railroad to accept alike office in the Providence division of the New York & New England Railroad. H. D. Masters, at present Chief Train Despatcher, will succeed Mr. King as Superintendent of the Philadelphia, Reading & New England.

—Mr. J. S. Leeds, Manager of the California Traffic Association, has been re-engaged for another year. It appears that there was some objection to this on the ground that the salary, $10,000, was excessive, but as against this it was asserted that Mr. Leeds was the only man who could accomplish the construction of the San Joaquin Valley Railroad, which the merchants of San Francisco hope to build as a competitor of the Southern Pacific.

—Mr. W. H. Truesdale, Third Vice-President of the Chicago, Rock Island & Pacific, has been given authority over the Operating Department, assuming the duties of General Manager. The latter position has been abolished on the resignation of Mr. E. St. John. This will give Mr. Truesdale executive authority over both the Traffic and Operating Departments. He became Vice-President of the Rock Island Railroad a few months ago, having previously been President and Receiver of the Minneapolis & St. Louis road.

—Mr. Henry J. Page, until recently Traffic Manager of the Elgin, Joliet & Eastern Railroad, died at Chicago last week. He had held the position of Traffic Manager of that road for five years, until Aug. 1 last, when he resigned. He was reelected Director of the company a few weeks before his death. Mr. Page was formerly General Freight Agent of the Cincinnati, Indianapolis, Chicago & St. Louis, known as the Big Four Railroad, for nearly 25 years. He resigned in 1889, soon after the consolidation which formed the present company.

—Mr. J. D. Farrell, General Superintendent of the Pacific Division of the Great Northern Railroad, with headquarters at Spokane, Wash., has resigned that position. Mr. Farrell was Superintendent of the Cascade Division until last summer, when his title was changed to General Superintendent. He has been connected in a number of capacities in the operating departments of Western railroads. He was employed on the Canadian Pacific Railroad during its construction under John M. Egan. Later he was on the St. Paul, Minneapolis & Manitoba and the Chicago, St. Paul & Kansas City, on which he rose to be Division Superintendent. He resigned to go to the Cascade Division of the Great Northern as Superintendent.

—Mr. Henry Bartlett, who has just been appointed Superintendent of Motive Power of the Boston & Maine, has been Assistant Engineer of Motive Power on the Pennsylvania for several years, with headquarters at Altoona, where his jurisdiction included the whole of the Pennsylvania Railroad Division. Mr. Bartlett is about 33 years old and was born in Lowell, Mass. He was graduated from Harvard University in 1885 and served apprenticeships in the shops of the Boston & Lowell and of the Pennsylvania at Altoona. He is a son of Mr. C. E. A. Bartlett, President of the St. Johnsbury & Lake Champlain road. Mr. Amos R. Barrett, who has been for some years Superintendent of Motive Power of the Boston & Maine Railroad, has been ill for several months, and has resigned his position on that account.

—Mr. William H. Russell, Consulting Engineer of the Boston & Albany, died at his home in West Springfield, Mass., on Dec. 8, at the age of 76. Mr. Russell was one of the oldest railroad men in the country in experience as well as in years, his first service having been in 1836, when he worked on the survey of the old Western Railroad between Springfield and Albany. When the road was completed he retired to his home in Somers, Conn., for a few years, but in 1845 he resumed work, being employed by Clyde & Stone in the construction of the Hartford & New Haven Road. He also worked with the surveyors on the New York & New Haven, the Cheshire (New Hampshire), the New London Northern and the Passumpsic. His long continuous connection with the Boston & Albany dates from June 18, 1858, when he was made Chief Engineer. His assistants have borne the the principal burden of the work for several years and about three months ago the Chief Assistant, Mr. Walter Sheppard, was made Chief Engineer, Mr. Russell's title being changed to Consulting Engineer. Of the three brothers, W. H., J. E., and Charles O., all well-known men, only the latter now survives.

Mr. Russell enjoyed the confidence of the Directors to an unusual degree, his character being strong and conservative. He was universally liked by his associates though often apparently taciturn, he was of the most kindly disposition.

ELECTIONS AND APPOINTMENTS.

Cammal & Black Forest.—The company held its annual election on Dec. 1, and elected the following officers: President, R. McCullough, Jersey Shore, Pa.; Vice-President, D. Shepp, Tamaqua, Pa.; Secretary and Treasurer, Joseph Wood, Jersey Shore; General Manager, J. S. Childs; Assistant General Manager and Chief Engineer, C. B. McCullough, Cammal, Pa, and Auditor, H. B. Humes, Jersey Shore, Pa. The following Drectors were elected: R. McCullough, D. Shepp, Joseph Wood, J. S. Childs, C. B. McCullough, W. C. Wood and H. S. Childs.

Chicago, Rock Island & Pacific.—E. St. John having resigned the position of General Manager of this company's lines, to accept service with another company, W. H. Truesdale, third Vice-President has assumed the duties of General Manager, in addition to the duties of Third Vice-President.

Choctaw, Oklahoma & Gulf.—H. E. Yarnall has been appointed Local Treasurer of the road with offices at South McAlester, I. T. George E. Starr has been appointed Assistant to the President, with office at Philadelphia.

Mexico, Cuernavaca & Pacific.—At the annual meeting of the stockholders in the City of Mexico, on Dec. 9, the Directors chose J. H. Hampson, President and General Manager; W. O. Staples, Vice-President and Treasurer, and Charles Wheeler, Secretary. About 40 miles of the road is in operation from the City of Mexico.

New York, Pennsylvania & Ohio.—The old Directors of the railroad company were re-elected on Dec. 6 at the annual meeting in Cleveland. The only change in officers was the election of C. C. Mason as Secretary in the place of E. Tupper. Mr. Mason is Secretary of the Youngstown & Austintown Railroad Company, one of the company's branch lines. The present officers are Charles E. Whitehead, President; John Tod, Vice-President; C. C. Mason, Secretary; E. R. Perkins, Treasurer; J. T. Wann, Auditor.

Nippenose Valley.—At Oral Hall, Pa., Dec. 4, these officers were elected: Directors, G. W. Clark, Sr., Levi Gann, Jonas Moore, Henry C. Eck, Jacob Clark, John Engler and J. B. Denworth. J. B. Denworth is President; Jonas Moore, Secretary; John Engler, Treasurer.

Superior, Eastern & Southern.—The officers elected by this new company, at Sheboygan, Wis., are: President, Frank Geele, Mayor of Sheboygan; Vice-President, R. H. Lacid, St. Louis; Secretary and General Manager, John D. Cameron, Chicago; Treasurer, John Hunner, Madison, State Treasurer of Wisconsin.

Toronto, Hamilton & Buffalo.—W. N. Warburton has been appointed General Freight and Passenger Agent of the road, vice M. Potticary, transferred.

Wilkes Barre & Eastern.—Frank Smith, late General Freight Agent of the Lehigh & Hudson road, succeeds Isaac J. Demarest as General Passenger Freight Agent, with office at Wilkes Barre, Pa.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Canadian Roads.—Messrs. L. Englehart and John Kerr, of Petrolea; Matthew Wilson, Q. C., and W. Ball, of Chatham, Ont., propose to construct a new railroad connecting Chatham, Petrolea and Wallaceburg, and eventually extending to a point on Lake Erie.

Charleston, Clendennin & Sutton.—At the recent election in Clay County, W. Va., it was voted to subscribe $25,000 to the capital stock of the railroad, which has begun work on an extension of its line from the present terminus at Clendennin, through Clay County, along the Elk River Valley to Sutton, Braxton County.

Chateauguay & Northern.—Application will be made to the next Quebec Legislature by A. F. Savaria, of the town of Waterloo; Dr. Cartier, of Ste. Madeliene; Eugene Malo, John Chaffers and Pierre Poulin, of the City of Montreal, and others for an act to incorporate the above company to construct a railroad from a point on the boundary lines between Quebec and New York, thence northerly across the Island of Montreal and continuing to a point on the Great Northern Railway in the County of Joliette.

Cheat River.—Considerable progress is making on the survey of this line which is to begin with a connecting with the Baltimore & Ohio at Point Marion, Pa., and follow Cheat River through West Virginia to Rowlesburg, W. Va. The survey is under the direction of Johnathan Barrett, of Pittsburgh, Pa., and the work has been completed to Big Sandy Creek.

Hinton & New River.—Mention was made in this column last week of the fact that the voters of Summers County, W. Va., had voted to subscribe $30,000 to the capital stock of this road, and that this guaranteed the beginning of the work of construction during January. The road now has a paid up capital of $150,000, all taken by local interests. The road will start from Hinton, Summers County, on the Chesapeake & Ohio, and follow the New River to Glenn Linn, on the Norfolk & Western, a distance of 30 miles, through Summers and Mercer Counties. It will have a branch of 25 miles up Bluestone River to the headwaters of Piney Creek in Raleigh County, to reach the Flat Top coal field. The line will give direct connection between the New River and Flat Top Pocahontas coal fields in West Virginia, and will considerably shorten the distance between points on the Chesapeake & Ohio and Norfolk & Western roads. The officers of the company are: J. T. McCreery, Coal Gate, Va., President; J. C. James, of Hinton, W. Va., Vice-President; and J. A. Parker, of Hinton, Secretary and Treasurer. The Directors are: J. T. McCreery, J. C. James, R. R. Flannigan, James H. Miller and M. J. Cook. The principal office will be at Hinton.

International & Oak Orchard Harbor.—A charter was filed in New York State last week by this company. Its capital stock is $175,000. The road is to extend from Albion, Orleans County to the shore of Lake Ontario, a distance of 10 miles. The Directors are: George A. Wingate, Jacob Cole, William H. Hazzard, Robert Avery, James H. Cox, Charles E. Hart, William Hallock and George W. Barrett, of Brooklyn. The Batavia & Northern was incorporated previously to build the southern portion of the road from Batavia to Albion.

Monterey Mineral Ry. & Terminal Co.—This company, whose organization has been recently referred to in these columns, is building a railroad from Monterey to San Pedro, Mex., 15 miles. The contracts for grading and track-laying are let to David Shaw, of Monterey, and one-half of grading is completed, and 500 men are now engaged on the line. The work remaining to be done is light. The maximum grades are four per cent., maximum curves are 18 deg. All bridges at present are of wood, one of 378 ft., one of 200 ft., and the others small structures, amounting altogether to 4,200 ft. The officers of the company are President, W. Johnston, Liverpool, Eng.; Vice-President, C. K. Lord, Baltimore, Md.; Secretary and Treasurer, General John Gill, Baltimore.

Montreal & Ottawa.—The Canadian Pacific has made a new agreement regarding the construction of this branch In substance the important clauses are as follows: The Canadian Pacific is to construct and operate the road as far west as Alfred Village, Ont., during 1895; to expend $50,000 on construction work westward from Alfred in addition to the $100,000 which the company in the Dominion Government's agreement is bound to expend during the year 1896; no further extension of time shall be granted and the road shall be completed to Ottawa at as early a date as possible.

New Roads.—The new railroad, building by H. B. Camp, of Aultman, O., when completed will be 22 miles long, extending from the Pennsylvania road just west of Shreve, O., to the New York, Pennsylvania & Ohio road at Ashland, passing through a rich section of country. Eight miles of the road are completed and regular freight trains have been put on. Six miles further have been graded and are ready for the ties. The construction work has been done by William Weaver, of Shreve. He has stopped laying track to ballast the roadbed, when he expects to again go on with the track-laying.

Northern Pacific.—The decision of the Receivers to build to Lewiston, Idaho, as soon as possible, will necessitate but a small amount of construction work. The new line will consist of a 22-mile extension of the Spokane & Palouse Railroad from Juliett, near the Idaho line, to Lewiston. The roadbed was graded for 12 miles when the branch was built in 1891. The 10 remaining miles of the line runs through the Nez Perce Indian reservation, a right of way through which must be obtained. It is expected the extension will be built next year.

Ohio River.—It is stated on good authority that this company, now operating a line in West Virginia along the Ohio River from Wheeling, W. Va., to Huntington, W. Va., is contemplating an extension from Huntington to Ashland, Ky., to connect with the Lexington Division of the Chesapeake & Ohio.

Ottawa & Gatineau Valley.—The general manager of this road says that the line will probably be extended to within a short distance of Desert next summer.

Pittsburg, Morgantown & Fairmont.—This company, which, is operating a line from Fairmont, W. Va., via Morgantown, W. Va., and Uniontown, Pa., to Pittsburg, has commenced the work of relaying with heavy rails that part of the line from Fairmont to Morgantown. This section of the road was built for local and coal traffic in 1885, and laid with iron rails. Since the opening of the line to Pittsburgh the old roadbed is not sufficient for the heavy coal traffic from the Fairmont region. The road is a branch of the Baltimore & Ohio.

Pontiac & Pacific Junction.—At a recent meeting of the railroad company, it was decided to make Black River the terminus of the road for the present. To extend the line to Pembroke, Ont., as proposed would require the construction of two bridges over the Ottawa River at Allumette Island, at a cost of $200,000, which amount the company was not prepared to expend at present.

Quebec Railroads.—Following is the list of the railroads subsidized this year by the Provincial Legislature with their respective amounts: Quebec & Lake St. John, $389,258; Baie des Chaleurs, $169,180; Montreal & Western, $85,000; Ottawa & Gatineau Valley, $72,800; Canada-Atlantic, $7,000; Montford Colonization, $34,250; Orford Mountain, $21,520; Lothmiew & Migantic, $37,983; United Counties, $37,042; Phillipsburg-Quarrier Junction, $25,720; Quebec, Montreal, Ottawa & Occidental, $46,977.

St. Louis, Perry & Chicago.—A new railroad to be organized under this title will soon be incorporated in Illinois. It will run from Pittsfield, in Pike County, to St. Louis, via Alton. The preliminary survey will be commenced within a few weeks.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The earnings for October of the main line are given in the following table:

	1894.	1893.	Dec.
Gross earn	$1,284,400	$4,512,359	$227,959
Oper. expen....	2,713,062	2,723,613	10,551
Net earn....	$1,571,338	$1,788,746	$217,408
Four months:			
Gross earn....	$13,488,018	$15,876,808	$2,388,790
Oper. exp	10,003,947	10,127,249	123,302
Net earn....	$3,484,071	$5,749,559	$2,265,488

The St. Louis & San Francisco for October decreased $11,760 in gross and increased $4,075 in net earnings. The Atlantic & Pacific increased $36, 537 in gross and $59,825 in net. The Colorado Midland increased $8,768 in gross and $1,232 in net earnings.

Brockville, Westport & Sault Ste. Marie.—The Superintendent of the railroad has been appointed Receiver pending the trial of actions entered against it by the Knickerbocker Trust Co., of New York, Cooper, Kinman & Co. and the Dominion Wire Works Co.

Chesapeake, Ohio & Southwestern.—It seems very likely that the Illinois Central will obtain entire control of this property to the exclusion of the Louisville & Nashville. The former company now holds a majority of the first mortgage bonds and announces that it will purchase on February 1 next, the remaining outstanding bonds paying $1,134.61 for each $1,000 bond, the price it gave for the bonds, it already controls. It will be remembered that the control of the property was purchased about a year ago from C. P. Huntington under an arrangement between the Illinois Central and the Louisville & Nashville. Payment for the property was made to Mr. Huntington in $5,500,000 four per cent. bonds of the Illinois Central Company, but that company received from the Louisville & Nashville, $5,000,000 five per cent. bonds for $5 000,000. The Illinois Central was transferred to the Louisville & Nashville, the securities carrying control of the Chesapeake, Ohio & Southwestern. Under this agreement the Louisville & Nashville was to secure and operate the larger portion of the railroad, the object of the Illinois Central being to secure a shorter connection for its main line to Memphis and New Orleans by the use of the line from Fulton to Memphis. Soon after this agreement was made public, proceedings were begun by the State of Kentucky to prevent the Louisville & Nashville from carrying out its part of the agreement or to operate the Chesapeake, Ohio & Southwestern on the ground that it was a parallel road, and that such purchase and operation would be contrary to the State Constitution. The Attorney-General was sustained in this suit in the lower courts and the matter is now pending appeal. This being the state of affairs, the Louisville & Nashville was prevented from meeting the interest due last July on the $5,000,000 five per cent. bonds held by the Illinois Central. The latter has availed itself of the right to return the security and cancel the contract. The officers of the Louisville & Nashville insist that the default was merely technical, the company being restrained from paying the interest by the suit of the Attorney-General.

Cincinnati Northern.—The Dayton & Cincinnati Terminal Railroad Co. has changed its name to the Cincinnati Northern Railway Co.

Cincinnati, Jackson & Mackinaw.—Upon the application of Nelson Robinson, of New York, General Manager F. B. Drake has been appointed Receiver of the company by the United States Circuit Courts of Ohio and Michigan. This step has been taken at the instance and with the concurrence of the Brice-Thomas party, which recently secured control of the property with the purpose of reorganizing it. The receivership is based upon the default made in the interest due on Dec. 1 on the bonds of the company. The present company was organized in March, 1892, to take over the Cincinnati, Jackson & Mackinaw Railroad, sold under foreclosure several months previous. The foreclosure sale was attended with a number of unusual features including the purchase of a piece of road in the middle of the system by one interest and of the ends by another. An attempt was made to lease the property to the Cincinnati, Hamilton & Dayton, but the courts declared such a lease illegal. The reorganization following created an issue of $4,800,000 4 per cent. bonds, of which $4,250,000 were required for purposes of reorganization. The new bonds were issued at par for old bonds and the interest accruing on the latter to Dec. 1, 1894, when the first coupon on the new 4s became payable. The receivership is thus instituted on the default of the first interest that became obligatory on the new company.

Dallas Rapid Transit.—This property at Dallas, Tex., was sold out under foreclosure by sheriff last week for $35,000 to W. T. Favi and others for first mortgage bondholders.

Louisville, Evansville & St. Louis.—The reorganization plan proposed by the committee of which C. S. Fairchild, of New York City, is the Chairman, has been temporarily abandoned. This action, it is stated, is due to the belief that there will be a material improvement in the earnings of the company within a short period, and it is deemed only fair to the security holders to temporarily postpone the formulation of the terms for the reorganization to await better conditions. The appointment of a Receiver for a division of the road at Springfield, Ill., recently, was at the instance of the New York Security & Trust Co., of which Mr. Fairchild is President, and will not in any way interfere with the Reorganization Committee's plan. The court has recently ordered the Receiver to pay the interest on the first mortgage bonds out of the earnings of the company.

Missouri, Kansas & Texas.—The company has filed at Austin, Tex., an amendment to its Texas charter granting permission to extend its road from the present terminus at San Marcus to San Antonio, a distance of 50 miles. The survey for this extension was made last year.

New York, Lake Erie & Western.—Drexel, Morgan & Co., who have had charge of the reorganization plan of this company issued in January, 1894, have this week issued a circular proposing several modifications in the plan as then outlined. They state that $32,000,000 out of a total of $38,000,000 of the second consolidated mortgage bonds have been deposited with the firm under the terms of the plan, but they say that the earnings of the railroad have continued to be inadequate to meet the interest on the proposed issue of the new second mortgage bonds, amounting to $70,000,000. They propose that the December and June coupons of the new bonds be funded until such time as the net earnings may be sufficient to pay the interest so that the interest coupon due Jan. 1, 1895, will be the first for which the company is to be at present liable. The bondholders are asked to give the firm authority to foreclose the property under this mort-

gage if this interest is not paid, and if that action is deemed advisable. They point out that under the new mortgage bondholders are entitled to foreclosure after one default in interest. The second consolidated mortgage for which the new mortgage is to be exchanged cannot be default except on six successive coupons.

The plan of reorganization, which was recommended by the Directors in January last, and which Drexel, Morgan & Co. agreed to assist in carrying out, provides for the issue under a blanket mortgage of $70,000,000 five per cent. 100-year bonds into which other bonds are to be exchanged. Holders of second mortgage and funded coupon bonds are required to pay 25 per cent. assessment, for which they receive new bonds at 90, and income bondholders to pay 100 per cent. and to receive therefor new bonds at 90. The distribution of the new bonds was explained as follows: $33,597,400 to acquire the present second consols, $4,031,400 to acquire the funded coupons, $500,008 to acquire the incomes, $9,915,208 for subscription as above, $6,512,800 to acquire the old reorganization first lien and collateral trust bonds, and $15,435,184 to be expended for construction, equipment, etc., not to exceed $1,000,000 in any one year except that $500,000 may be used to acquire existing car trusts. In their circular recommending the plan to security holders the Directors stated that the floating debt of the company at the time amounted to nearly $9,000,000, exclusive of car trust obligations. The annual report, recently issued, shows that in the fiscal year ended Sept. 30, 1894, the company failed to earn fixed charges and rentals by the sum of $1,167,407, and that at the end of that fiscal year the interest on funded debt in default amounted to $2,165,844.

North Galveston, Houston & Kansas City.—The negotiations between Hammett & Co., of St. Louis, and the owners of the Houston, Laporte & Northern, have been consumated and the same firm has secured control of the North Galveston, Houston & Kansas City Railroad. The parties to the negotiation are Judge F. W. Ford, of Houston, and C. H. Hammett, formerly President of the New Orleans & Northwestern, in Louisiana, who represent St. Louis and Eastern capitalists. The two railroads will be consolidated and the gap between Laporte and North Galveston of 16 miles will be speedily closed, which will give a continuous line from Houston to Virginia Point, opposite Galveston. Here it is propoed to build a bridge across West Bay, a connection to be made with the Galveston Western, and if this is not feasible, to build an independent line into Galveston. A bill has already been introduced in Congress to permit this company to bridge West Bay, Clear Creek and Buffalo Bayou at Clinton. Mr. Hammett states that if the legal consolidation of the two purchased lines can be speedily effected and right-of-way and terminal facilities arranged, the entire line may be in operation in six months. The line will be about the same length as the Gulf, Colorado & Sante Fé between Houston and Galveston. Active officers under the new organization are: T. W. Ford, President; Isaac Hefferon, Vice-President; C. H. Hammett, Vice-President and General Manager; J. H. Tennant, Secretary.

Northeastern.—Governor Atkinson, of Georgia, recently engaged Mr. Cecil Gabbett, formerly General Manager of the Central of Georgia, to make an inspection of the property of the Northeastern Railroad, which is operated by the State of Georgia. This road was formerly operated by the Richmond & Danville, but it was excluded from the reorganization scheme. The road has been operated for about 10 months by the State of Georgia, with Mr. Reaves as agent in charge. The net earnings for the 10 months have been something over $11,000, about $7,000 less than the sum required to meet the interest on the bonds. This showng was made by a heavy decrease in the items spent for repairs, about $1,500 having been expended in such work during this period instead of $6,000 as usual. Governor Atkinson therefore engaged Mr. Gabbett to make a thorough inspection of the property and to report upon what repairs and other improvements were necessary. During the first months of the operation of the road by the state, something more than the operating expenses were earned and the semi-annual interest was paid, but during the following six months an important deficit was reported and default was made. Several defaults were made before the railroad was taken over by the State, which have not yet been readjusted.

Ohio River & Charleston.—The reorganization of the Charleston, Cincinnati & Chicago under this name, which has been in progress for a good many months, has been finally completed, and at the meeting of the stockholders in Boston recently new officers were elected as already reported in these columns. Those now in control of the property represent the purchases of the various divisions of the Charleston, Cincinnati & Chicago, made at foreclosure at different dates between May, 1892, and May, 1893. The purchase money was raised chiefly in Boston and Philadelphia, two-thirds of it in the latter city. The Finance Co., of Pennsylvania, and the Investment Co., of Philadelphia, are largely interested in the property. Representatives of these corporations and others interested in the property, propose to make a thorough inspection of the railroad within the next few weeks and afterwards plans will be formulated for future improvements. The company has been reorganized with preferred and common stock, but no bonds have been issued as yet. The earnings are showing steady improvement. When the representatives of the bondholders took control in October, 1893, a deficit of about $50,000 had been reported for the year. For the last year, ending in October, a balance of $10,000 above expenses and taxes was reported. The Charleston, Cincinnati & Chicago was chartered Sept. 30, 1886, and the road, as far as completed, was put in operation in December, 1890. In the same month a Receiver was appointed in North and South Carolina and Tennessee, and on Feb. 20, 1891, in Kentucky. That portion of the road in Tennessee was sold May 12, 1892, to satisfy contractors' liens, and was purchased for $200,000 by the reorganization committee. The rest of the property was sold on May 2, 1893, and was also bought in for the committee, to which, on Oct. 1, 1893, the entire property was transferred. The property now includes 213 miles of completed track, divided as follows: Camden, S. C., to Marion, N. C., 172 miles; North Carolina State line to Ellison's Mills, Tenn., 32 miles; and Richardson to Whitehouse, Ky., nine miles.

Pennsylvania.—The earnings of the eastern lines for October are given in the following table:

	1894.	1893.	Inc.
Gross earnings	$5,939,999	$5,580,276	$359,722
Operating expenses	3,746,833	3,740,751	6,082
Net earnings	$2,193,166	$1,839,525	$353,64

Net earnings in 1892 were $2,065,114; in 1891, $2,470,761, and in 1890, $2,633,849.

The Western lines for October show a gross decrease of $280,895, and a net decrease of $255,061. The entire system for October shows a gross increase of $78,828 and a net increase of $98,580.

The statement of the Eastern lines for ten months is as follows:

	1894.	1893.	Dec.
Gross earnings	$48,084,631	$55,784,219	$7,699,588
Operating expenses	33,201,301	39,817,032	6,615,737
Net earnings	$14,883,330	$15,967,187	$1,083,857

Net earnings in 1892 were $16,597,700; in 1891, $17,955,809, and in 1890, $17,488,955.

The Western lines for ten months decreased $5,543,183 in gross and $1,943,722 in net earnings. The system for ten months decreased $13,242,775 in gross, and $3,027,579 in net earnings.

Philadelphia & Reading.—The following table of earnings gives the results for the railroad company for October, and the year to date:

Month of October.

	1894.	1893.	Inc. or dec.
Gross receipts	$2,001,791	$2,127 430	D $125,638
Gross expenses	1,067.987	1,074,269	D 6,281
Profit in operating	$933,804	$1,053,161	D $119,357
Other receipts	30,508	54,777	D 24,269
Profit for month	$964,312	$1,107,937	D $143,626
Equipment and other payments	159,608	$138,601	I 21,007
Fixed charges (estimated)	705,000	718,678	D 13,678
Total charges	$864,608	$857,279	I $7,329
Surplus	$99,704	$250,659	$150,955

Year to Date.

Gross receipts	$18,411,686	$20,880,973	D$2,469,287
Gross expenses	10,437,644	12,466,883	D 2,029,239
Profit in operating	$7,974,042	$8,414,090	D $440,048
Other receipts	445,594	554,604	D $109,010
Profit for month	$8,419,636	$8,968,695	D $549,058
Equipment and other payments	2,018,000	1,187,162	I 146,838
Fixed charges (estimated)	7,800,000	7,905,466	D 105,466
Total charges	$9,818,009	$9,776,628	I $41,380
Deficit	$1,398.372	$807,933	I $590,439

Portland & Ogdensburg.—Bonds of the city of Portland to the amount of $154,500 will fall due next February. To meet the payments, the city will probably sell its stock in this railroad, of which it owns 23,561 shares. It is expected that the stock held by the city can be sold for $45 a share, if this action is decided upon.

Sioux City, Oneil & Western.—On the motion of the Manhattan Trust Co., of New York, Trustee for $2,340,000 of the railroad bonds, Judge Caldwell, in the United States Circuit Court at St. Louis has ordered a foreclosure sale. The road has been in the hands of a Receiver for some time.

Southern.—The report of earnings for October, and since July 1, makes the following comparison of earnings:

	1894.	1893.	Inc. or dec.
Gross earnings	$1,817,082	$1,685,325	I $131,756
Oper expen. and taxes	1,070,384	1,046,161	I 24,223
Net earnings	$746,697	$639,164	I $107,533
Per cent. ex. to earnings	59	62	
Four months, July 1 to Oct. 31:			
Gross earnings	$5,304,919	$4,907,888	I $397,030
Operating expenses	3,485,691	3,527,879	D 43,187
Net earnings	$1,820,228	$1,380,009	I $440,217
Per cent exp. to earnings	66	72	

St. Louis & San Francisco.—The committee formed for the protection of the four per cent. consolidated mortgage bonds, consisting of Francis Peabody, Jr., of Boston, and J. Kennedy Tod and Frederick W. Whitridge of New York, state that the situation in respect to these bonds is as follows: The mortgage was intended to secure $50,000,000 bonds to be issued for certain specified purposes. Of that amount $14,000,000 have been issued, of which about $4,000,000 were exchanged for the seven per cent. stock of the St. Louis & San Francisco and for Atlantic & Pacific second mortgage bonds. The remainder were issued, so the committee is informed, directly to the Atchison Company to the extent of $4,877,100 in payment of the floating debt of the St. Louis & San Francisco to the Atchison, and a further amount of $5,000,000 bonds for the guaranty by the Atchison of the entire issue of $50 000 000. The balance of the bonds so obtained by the Atchison were exchanged for certain Atlantic & Pacific bonds, leaving about $6,000,000 in legal possession of the Atchison. Most of them are doubtless pledged. About $8,000,000 are therefore in the hands of the public here and abroad, and of these the committee already represents a large number. The committee considers it necessary to be prepared to take positive action, in view of the approaching plan for the reorganization of the Atchison Company and to co-operate in certain legal proceedings contemplated with foreign holders who are working in harmony with the committee. To make such action effective it is desirable that as large a number of bonds as possible be deposited, subject to the order of the committee under its plan. No liability is incurred by the bondholders.

Superior, Eastern & Southern.—This company made application to the Secretary of State at Madison, Wis. last week for articles of incorporation. The new railroad will be about 400 miles in length, through the counties of Douglas, Bayfield, Taylor, Lincoln, Oneida, Marathon, Marinette, Shawano, Langlade, Price, Waupaca, Outagamie, Sheboygan. The capital stock is $3,000,000, and the incorporators are: Mayor Frank Geele, Sheboygan; J. D. Caleron, Chicago, and State Treasurer John Hunners, Madison.

Zanesville Belt.—The United States Circuit Court at Columbus, O., has ordered that the sale of the Belt Railroad be postponed till Jan. 15. The sale is to take place under a mortgage for $250,000 held by the Mercantile Trust Co. of New York.

TRAFFIC.

Traffic Notes.

The merchants of Memphis are moving for the formation of a freight bureau.

The Baltimore & Ohio, as well as the Pennsylvania, now accepts coupons from mileage ticket books in payment of excess baggage charges.

The Illinois Railroad Commissioners have decided, on complaint of W. H. King, that the Pennsylvania Company charges too high for switching cars at——, and have ordered a $5 rate reduced to $2.

A "coal-boat rise" began in the Ohio River on Dec. 2, and by the 5th boats carrying about 370,000 tons of coal had started down stream from Pittsburg. This quantity is equal to nearly 15.000 car loads of 25 tons each.

The shipments of grain from Buffalo over the Erie Canal this year amounted to 48,428,521 bushels, a very slight increase from the preceding year. It is said that the average rate received by the boats on grain from Buffalo to New York was 3.2 cents a bushel.

The freight lines between New York and the West, which run over the roundabout routes, the National Despatch, the lines via Newport News, etc., have withdrawn the very low commodity rates which have been in effect to the Mississippi River for many months on freight going beyond the river.

Three large vessels have just been added to the fleet plying between Newport News, Va., and England, making nine in all. The Norfolk & North American Steamship Co. has just put on the first ship of its new line to run direct from Norfolk, Va., to Liverpool. This vessel is a new one, 447 ft. long, 43 ft. wide, and 27 ft. deep. Seven others will be built for the same company.

The Railroad Commissioners of Kansas have ordered the Kansas City Northwestern, formerly the Kansas City, Wyandotte & Northwestern, to restore a passenger train between Kansas City and Leavenworth which was taken off some time ago. The road argued that the train would have to be run at a loss, but the Commissioners, without denying this, ordered the restoration of the train on the ground that numerous subsidies and grants of right of way along the line had been given to the road on the understanding that a certain degree of accommodation should be provided.

The very heavy cotton movement in Texas this year is partly shown by the following cotton report of the Houston & Texas Central for the month of November, showing the total receipts at Houston to be 127,243 bales, consigned as follows: For Houston, 38.662 bales; to Gulf, Colorado & Santa Fé, 15,386 bales; to Houston Direct Navigation Co. (boats for Galveston), 43,769 bales; to Southern Pacific (to go eastward by rail), 29,426 bales. The total receipts of the road from Sept. 1 to Nov. 30, 1893, amounted to 229,002 bales; for the same period this year, 420,890 bales, an increase of 191,888 bales.

Shoe manufacturers of Brockton, Mass., state that the Trunk Line railroads have advanced the classification on shoes 50 per cent., except where the cases are strapped with iron; and the new rate is to go into effect on Jan. 1. The shippers complain loudly at this and say that they cannot afford the expense. One of them says that he will have to cancel some of the orders already taken if he has to comply with the new rule. We do not blame these people for being displeased, for, as intimated by them, they want about a year's notice to adjust themselves to a new rate; but we suggest to them two points: First, the rates to Western points are very low even after the increase of 50 per cent., and second, the straps, if sealed, will probably make the collection of claims for shortage much easier. Why do not the railroads demand seals as well as straps.

Chicago Traffic Matters.

CHICAGO, Dec. 12, 1894.

Eastbound shipments last week showed a considerable gain, which means that shippers who held back the previous week in the hope of breaking down the agreement to maintain the advance have sent their freight forward. The officials of all the lines claim that they are strictly maintaining the advance and that the large increase in shipments last week is attributable to this cause. Westbound shipments continue unsatisfactory.

The lake navigation season closed Dec. 9. More corn went forward last week than during any preceding week, since the clearance of the winter fleet, amounting to 1,961,000 bushels, with charters for 380,000 bushels, which cleared yesterday. A comparison of clearances from this port for the seasons of 1893 and 1894 shows:

	1894.	1893.
Flour, bbls.	2,190,385	1.471,060
Wheat, bu.	14,530,883	19,720,775
Corn, bu.	34,946,981	62.977,955
Oats, bu.	14,968,832	22,563,294

These figures include several charters not out yet and probably 300,000 bushels more corn will go out this week. The season as a whole has been remarkably free from rate wars, and the business has been kept well in hand. Vessel owners feel sure that they have made the most that was possible out of a poor grain-carrying season.

Central Traffic Association lines are again considering the plan for a division of eastbound passenger traffic which fell through a year ago, and a meeting has been called for Dec. 18 to consider the matter.

The representatives of the trans-continental lines are still in session. While some progress has been made towards the formation of a new association, the probable result is as far from being apparent as it was last week. The main difficulty now in the way is the demand of the Canadian Pacific and the North Pacific Coast lines for differential rates.

Freight representatives of trans-continental lines have practically agreed to an advance in all rates to California and North Pacific Coast points, and the rate clerks are now checking out the rates.

A committee report is before the general meeting of trans-continental passenger representatives to advance all round trip Pacific Coast rates $10 going and returning via direct routes, $7.50 going and returning via the Shasta route, and $15 and $12.50 respectively, going via one and returning via another route. Also a proposition to advance Colorado, Utah and Montana rates.

All the lines interested in the Western immigrant clearing house met yesterday to consider the question of commission payments to meet the competition of the Canadian Pacific. At the conclusion of this meeting the general meeting reconvened for further consideration of trans-continental matters.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending Dec. 8, amounted to 45,433 tons, against 34,182 tons during the preceding week, an increase of 11,251 tons, and against 62,266 tons for the corresponding week last year. The proportions carried by each road were:

ROADS.	WEEK TO Dec. 8.		WEEK TO Dec. 1.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	2,344	5.5	2,321	6.9
Wabash	4,145	9.1	2,508	7.3
Lake Shore & Mich. South.	5,020	11.0	4,239	12.4
Pitts., Ft. Wayne & Chicago.	7,064	15.5	4,890	14.3
Pitts., Cin., Chi. & St. Louis	6,458	14.2	5,793	16.8
Baltimore & Ohio	3.441	7.6	2,645	7.7
Chicago & Grand Trunk	4,718	10.3	3,562	10.5
New York, Chic. & St. Louis	4,877	10.7	3,671	10.7
Chicago & Erie	5,503	12.0	3,407	10.0
C., C. C. & St. Louis	1,863	4.1	1,146	3.4
Totals	45,433	100.0	34,182	100.0

Of the above shipments 2,816 tons were flour, 12,501 tons grain and mill stuff, 9,770 tons cured meats, 10,254 tons dressed beef, 1,339 tons butter, 2,217 tons hides, and 4,521 tons lumber. The three Vanderbilt lines carried 27.2 per cent., the two Pennsylvania lines 27.7 per cent., Lake lines carried 53,820 tons against 61,590 tons last week.